

JOB NO.:

IGS04-08

W.O. #04-16783-0

TITLE:

UNIT OXYGEN PROBE REPLACEMENT SYSTEM

DESCRIPTION:

This project replaces the present COSA oxygen probe system on the boiler with a multiple position 16 probe system on the boiler economizer outlet area.

JUSTIFICATION:

ECONOMIC

PAYBACK PERIOD: years

BENEFIT/COST RATIO:

ECONOMIC LIFE: 20 years

PV SAVINGS: \$

SALVAGE VALUE: \$0

RATE OF RETURN: %

ADDITIONAL DETAIL:

The present oxygen indication system has become unreliable over the last two years. The maintenance requirements have continued to escalate on this system as the probe failures have continued to increase. This has caused the unit operator to run the unit without accurate O₂ indication. In these situations we can run with too much airflow causing us to be inefficient, which has been the case most of the time or low airflow which can cause a combustion problem with the boiler. The new design will have eight probes on the east side and eight probes on the west side at varying depths to provide a more accurate averaged signal from each side. We will then be able to receive an accurate indication of the stratification that is present in the economizer outlet and provide an accurate averaged signal to the operators.

COST ESTIMATE:

	2004-2005	2005-2006	Total
Engineering Labor	\$10,000	\$10,000	\$20,000
IPSC Labor	\$15,000	\$15,000	\$30,000
Contractor	\$186,000	\$195,000	\$381,000
Material	\$255,000	\$175,000	\$430,000

Job Total	\$468,004	\$397,005	\$861,000
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ALTERNATIVES: Continue to use existing inaccurate indicators.

EFFECT OF DEFERRAL: Maintenance and replacement costs continue to increase. Parts are difficult to obtain in a timely manner. This year parts on the last two orders have taken 142 days and 43 days to receive.

PROJECT HISTORY: None.

PROJECT: IGS04-08: O2 Probe Replacement Project

1. General

This sections outlines the scope, purpose, and schedule for the project IGS04-08.

2. Purpose

The purpose of this replacement project is to increase the accuracy, reliability, and reduce maintenance of the Oxygen (O2) measurement systems for Unit 1 and Unit 2 at the Intermountain Generating Station (IGS).

3. Scope

The scope of this project includes the replacement of the Unit 1 and Unit 2 O2 measurement systems including sensors, probes, transmitters, calibration systems, averaging systems, diagnostic systems, inputs to the unit control and information systems, and all required wiring and tubing.

4. Schedule

The replacement project shall be completed pursuant to the following schedule:

- a. Selection of replacement system: November 2004
- b. Completion of construction package: December 2004
- c. Delivery of selected replacement system: January 2005
- d. Installation of Unit 1 replacement system: March 2005
- e. QC of Unit 1 replacement system: March 2005
- f. Installation of Unit 2 replacement system: March 2006
- g. QC of Unit 2 replacement system: March 2006
- h. Completion of closeout package: April 2006

DETAILED SPECIFICATIONS:

1. General

This section contains the specifications for replacement O₂ measurement systems for the Intermountain Generating Station (IGS) Unit 1 and Unit 2 operating units.

2. Definitions

- a. **Replacement System:** O₂ measurement system including: sensors, transducers, transmitters, calibration and diagnostic units or components, and any other hardware and software components required to meet the specification criteria
- b. **Actual O₂ %:** Refers to the actual amount of O₂ as a percentage of the air mass passing through the boiler backpass in a unit of time as computed by applying all necessary corrections for the effects of temperature, pressure, etc.
- c. **Measured O₂ %:** Measured level of actual O₂ detected or measured by the O₂ measurement system.
- d. **Zero Gas:** Test gas used to calibrate the O₂ sensor zero.
- e. **Span Gas:** Test gas used to calibrate and set the O₂ sensor span.
- f. **Check Gas:** Test gas of known concentration at mid-range within the sensor span that is used to check the O₂ probe sensor calibration.
- g. **Drift:** Undesired change in the input to output ratio of the instrument of a specified unit of time.
- h. **Exception:** Any feature or capability required by the specification that the replacement unit does not include or does not meet to the standard listed in the specification.
- i. **Inaccuracy:** Variation of replacement system measurement from actual measurement.
- j. **Linear Range:** The measurement range over which the changes in instrument output frequency are proportional to changes in concentration of the actual measured ranges of the measured element(s).
- k. **Linearity:** The maximum percentage deviation from average sensitivity over the linear range.
- l. **Mean time between failures:** Average measured time of service without failure or malfunction.
- m. **Repeatability:** Closeness of agreement of the instrument output of a number of consecutive measurements with the same value of input.
- n. **Sensitivity:** Ratio of change of output to the change of input.

3. Purpose

This section establishes the minimum requirements and capabilities for an O₂ measurement, transmitter, and calibration replacement system.

4. Scope

The scope of this section is limited to identification of the required performance criteria, system capabilities, and general requirements that must be met by any proposed replacement system.

5. Bidding

Qualified bidders shall have the option of bidding on the replacement system for the O₂

measurement/transmitter/calibration systems. The vendor bids shall include the following information:

- a. **Pricing:** Pricing quotations shall include:
 - i. Competitive quotes for:
 - (1) Phase 1: Unit 1 replacement system with February 2005 delivery.
 - (2) Phase 2: Unit 2 replacement system with February 2006 delivery.
 - ii. Delivered total cost for each phase.
 - iii. Itemized list and per unit cost of each system component for the proposed replacement systems.
 - iv. Itemized list and per unit cost of any training or equipment required for the installation, operation, calibration, and maintenance of the proposed replacement systems.
 - v. Per unit cost of purchased spares, shall be listed as an option.
 - vi. Per unit cost to pre-purchase of any of the phase 2 system components during phase 1 and the corresponding incremental decrease in the cost of the phase 2 system. This shall be listed as an option.
 - vii. Alternative spare parts pricing or plans, support options, or other vendor supplied system options. This shall be listed as an option.
 - viii. Per unit cost for any required calibration equipment not included with the replacement systems. This shall be listed as an option.
 - ix. Per unit cost for additional copies of replacement unit documentation. This shall be listed as an option.
- b. **Delivery Lead Time:** Required lead time to delivery shall be listed.
- c. **Technical Data:** Data sheets shall be provided which list the capabilities of the proposed replacement unit(s) for each of the specification criteria as listed under item 8 of this document. These sheets shall include but are not limited to:
 - i. Data on inaccuracy in percent of measurement and in percent of span.
 - ii. Replacement unit repeatability, sensitivity, rangeability or turndown, and output signal linearity.
 - iii. Minimum and maximum O₂ % measurement limits of the proposed replacement system.
 - iv. Estimated and guaranteed sensing element service life.
 - v. Mean time between failures.
 - vi. Power requirements.
 - vii. Output signals and protocols as delivered in the proposed device.
 - viii. Accuracy variations due to temperature, pressure, velocity, or opacity changes in the flue gas.
 - ix. Accuracy variations due to changes in ambient temperatures and pressures.
 - x. Methods used by the vendor to verify or qualify device accuracy.
 - xi. Siting criteria required for proper installation of the proposed replacement unit.
- d. **Options:** All enhancements or options included in the vendor bid but not required in this specification shall be identified as options.
- e. **Exceptions:** The vendor shall state “exception” or “no exception” to each item of this specification. Where exception is taken, the vendor shall state the reason for the exception and the actual capabilities of the replacement unit for that criteria.

6. Codes and Standards

All equipment shall be required to meet all applicable current and proposed safety, design, and performance specifications.

7. Schedule:

The replacement O2 measurement system shall be installed in 2 phases. Phase 1 will be the replacement of the Unit 1 system in March 2005. Phase 2 will be the replacement of the Unit 2 system tentatively scheduled for March 2006.

8. Detailed Performance Specifications

The replacement system shall meet the following design and performance specifications and criteria:

a. General Design and Service Conditions:

- i. The replacement system shall be a non-extractive, O2 measurement system.
- ii. The replacement system shall include sensors, probes, transmitters, automatic calibration, signal averaging, and diagnostic capabilities and equipment.
- iii. The replacement system sensors and probes shall be deployed in vertically mounted, 3 x 3, grids in the east and west boiler economizer exit gas ducts, respectively. Each grid shall consist of three (3) rows of probes with each of the rows deployed at different depths into the duct. Each grid row shall consist of three (3) probes per row
- iv. The replacement system sensors and probes shall be designed for insertion into and continuous operation in the flue gas stream of the IGS coal-fired boiler units upstream of fly ash removal equipment.
- v. Extractive system designs for the replacement system will not be accepted.
- vi. The replacement system transmitters, diagnostic, calibration, and signal averaging units shall be designed for installation at locations remote from the probes.
- vii. The replacement system shall communicate the measured O2 value for each probe, replacement system calculated averages, probe and system diagnostic information, and calibration status to the unit digital control system (DCS).
- viii. The replacement system shall include an automatic calibration capability as described below in section 8.e.

ix. System components shall be field repairable as described in section 8.f.

b. Quantity:

- i. Per phase, the replacement system shall provide a total of 18 sensors and probes with all required or recommended transmitter, calibration, and averaging units necessary to support. Of that total, six (6) sensor/probes units shall be provided in each of the following lengths: 6', 12', and 18'.
- ii. The vendor shall quote the purchase cost of replacement spares for each length.

c. Power: Primary power source for all system components shall be 120 VAC.

d. Sensor/Probe/Transmitter Requirements: The replacement unit must be capable of

accurately and reliably measuring and reporting flue gas oxygen levels pursuant to the following conditions and performance criteria:

- i. Measured Element: Oxygen (O₂)
- ii. Detector type: In-situ, Zirconium Oxide. Cells shall be of a robust design with a molecular bond between the Zirconia and the Platinum. Spray or Surface coatings will not be acceptable.
- iii. Typical Measurement Range: 0 to 21% O₂
- iv. Sensor/Probe/Flue gas temperatures: 0 to 900 degF
- v. Electronic Ambient Temperatures: 0 to 180 degF
- vi. Response time: shall be 5 seconds or less for 90% of span.
- vii. Analog outputs:
 - (1) Minimum of one (1) analog output, 4-20mA, to the DCS for the measured O₂ level measured at each individual sensor/probe.
 - (2) Minimum of one (1) 4-20mA output to the DCS for each replacement system calculated average..
- viii. Digital Outputs:
 - (1) Minimum of one (1) digital output to the DCS per sensor/probe for reporting sensor, probe, or transmitter malfunctions or failures.
 - (2) Minimum of one (1) digital output to the DCS for each soft or user configured replacement system alarm.
- ix. Digital Inputs:
 - (1) The replacement system shall include a minimum of one (1) digital input for remote initiation of each calibration cycle.
 - (2) The replacement system shall include a minimum of one (1) digital input for remote or local initiation of each calibration check.
- x. Probe Location: Positioned vertically from the top of the boiler exit gas ducts at a location upstream of the fly ash removal equipment.
- xi. Probe construction: Must be constructed of 316L stainless steel or of a material that will meet or exceed the properties of 316L SS in temperature, abrasion, and corrosion resistance. The sensor/probe assembly shall be removable during operation and field repairable.
- xii. Probe/Sensor Operating Temperatures:

The probe/sensor elements must be rated to operate reliably in an operating temperatures that range from 0 to 550 degC
The probe and temperature mus
- xiii. Sensor Protection: The sensor/probe assembly shall include a self-cleaning, fly ash filter at the probe tip and abrasion shield. Filters shall be a 10 micron Hastelloy X filters. Stainless steel filter membranes will not be acceptable.
- xiv. Probe lengths:
 - (1) Vendor must offer as a minimum standard probe lengths from 6' to 18'.
 - (2) The vendor competitive quotes per phase shall offer probes in lengths and quantities specified below:
 - (a) 6' - Qty 6
 - (b) 12' - Qty. 6
 - (c) 18' - Qty 6.

- xv. Transmitter Location: Located remotely from probes within 120' of the probes.
 - xvi. Power failure: System components shall retain calibration and configuration parameters in the event of a source power failure.
- e. The replacement system shall include the capability for automatic sensor calibration, sensor and system diagnostics and alarming, and measured process value averaging. The proposed replacement system automatic calibration, diagnostic, and averaging capability shall meet the requirements listed below:
- i. Calibration:
 - (1) The replacement system shall include the capability and all hardware and software necessary to calibrate each system sensor.
 - (2) The replacement system shall include Automatic, Semi-Automatic, and Manual initiated calibration cycles.
 - (3) Capacity: The replacement system shall include multi-channel calibration control units. Minimum four (4) channels required.
 - (4) The calibration unit shall have an ambient operation temperature range of at least: 0 to 90 degC.
 - (5) Validation: Allow for local and remote validation of probe reading without performing a calibration.
 - (6) Calibration Unit Hardware: The replacement system calibration units shall include all necessary regulators, flow meters, solenoid valves, and other such equipment as necessary for proper operation of the automatic calibration functions.
 - (7) Calibration Diagnostics and History:
 - (a) The replacement system shall be capable of storing the results of the last 10 calibrations and prediction the next required calibration based on the last 3 calibrations.
 - (b) The system shall be capable of detection of pressure induced calibration drift.
 - (c) The system shall generate an alarm in the form of a contact output to the DCS in the case of a failed calibration.
 - (8) Calibration Control:
 - (a) The replacement system shall be capable of clamping or removing measured sensor values from system averages during the calibration of that sensor.
 - (b) Once calibration of probe(s) is initiated, the replacement system shall automatically control and regulate the introduction, flow, and purge of calibration gases and purge air to the sensor for the vendor specified intervals and frequencies.
 - (9) Calibration Gas: The vendor shall recommend zero, check, and span gases and the vendor shall specify calibration gas consumption rates for a typical calibration cycle as applicable.
 - (10) Calibration Frequency: The vendor shall provide a recommended calibration schedule.
 - ii. Averaging and system diagnostics: The system shall include the capability to perform the following diagnostic and averaging functions and include any necessary hardware and software to provide these functions:

- (1) The replacement system shall include a minimum capability for six (6) user defined averages of individual or groups of O2 measurements with a 4-20mA output to the DCS for each average.
 - (2) The O2 system shall be capable of automatically excluding malfunctioning O2 measurements from O2 averages.
 - (3) Averaging units shall be expandable to 8 Channel units and channel card rack design shall allow for the removal and replacement of channel cards under power and without system shutdown.
 - (4) Averaging units shall include a color touch screen LCD display that provides a trend per point or group, numeric value of each channel and group average, alarm status and full system diagnostic in English language, Error code/Hart messages only for diagnostics will not be acceptable.
 - (5) The replacement system shall provide contact output alarms for any malfunctioning probe/sensor unit and each averaging/calibration/diagnostic unit(s). The replacement system shall also include user configurable contact outputs for alarm conditions in addition to channel or sensor/probe alarms specified above.
 - (6) Internal temperature alarm for the averaging/diagnostic/calibration unit.
- f. Field Repair: All system components shall be capable of removal for replacement or repair while the O2 system is on-line. Such actions shall not disrupt the proper operation of other O2 system components or the O2 system as a whole. Probes, transmitters, calibration units and other primary system components shall be field repairable or plug and play replacement of components requiring factory repair.
- g. Cabling: The vendor shall provide all non-standard cabling necessary between the sensor/probe assembly and the transmitter/diagnostic/averaging unit(s). All cabling provided by the vendor shall be tray rated cabling with a minimum rating of 600V, shielded, XLP/Hyp with oil resistant sheathing and heat resistance to 90 degC.
- h. Safety: The replacement system shall meet all applicable safety standards including but not limited to current National Electric Code, NEMA type 4 (non-hazardous dirt, dust, and wash-down protection), and NEMA type 13 (oil splashing and spraying protection) standards.
- i. Environmental Conditions: The replacement system must be capable of functioning properly while located with the following environmental conditions.
- i. Cleanliness: Must operate safely and accurately in conditions of oil seepage, windblown dust, and coal dust.
 - ii. Vibration: Must have high vibration stability.
 - iii. Ambient Temperatures: -25 degF to 180 degF
 - iv. Moisture: Must operate safely and accurately in conditions of water spray or deluge from area wash-down and other operating and maintenance events.
- j. Communications Requirements: The replacement unit must be equipped with the

following minimum output and communication capabilities:

- i. Local color LCD readout required.
 - ii. 4-20 mA outputs to the plant coordinated control system to include one per measured
 - iii. HART communication protocol.
 - iv. Equipped with or capable of implementation of Profibus protocol.
- k. Maintenance and Calibration:
- i. The replacement device shall be capable being calibrated while the generating unit is in operation and on-line without requiring the removal of the device or interruption of normal operations.
 - ii. Five year drift stability: Maximum drift of 1.0 percent over a 5 year period.
 - iii. Recommended calibration frequency should be one (1) year or longer.
- l. Moving Parts: With the exception of calibration gas control valves and regulation equipment, the replacement system shall have no moving parts subject to mechanical failure under normal operating conditions.

9. Documentation

The vendor shall provide seven (7) complete copies of the documentation necessary for the proper installation, operation, maintenance, and calibration for any purchased replacement unit. **In lieu of this requirement**, the vendor may provide one (1) complete set of such documentation and an electronic copy of that documentation with a letter authorizing IPSC to produce additional copies of the documentation on an as needed basis. Electronic copies of all written documentation must be in .PDF format. Electronic copies of drawings must be in AutoCAD format.

10. Start-up & Training

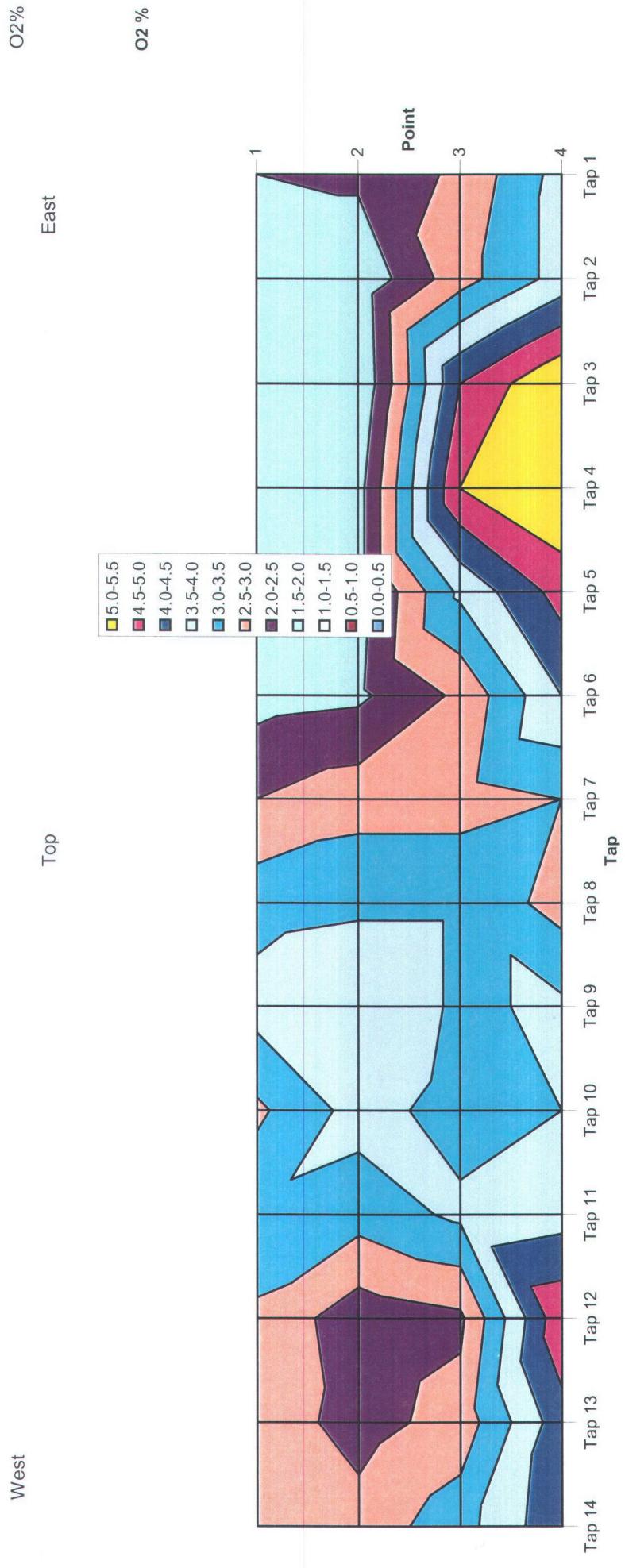
The vendor shall provide support and training for the installation, configuration, calibration, start-up, and maintenance of all vendor supplied equipment. The, vendor supplied, competitive quote shall include any costs for such support and training not already included in the system purchase price.

11. Warranty

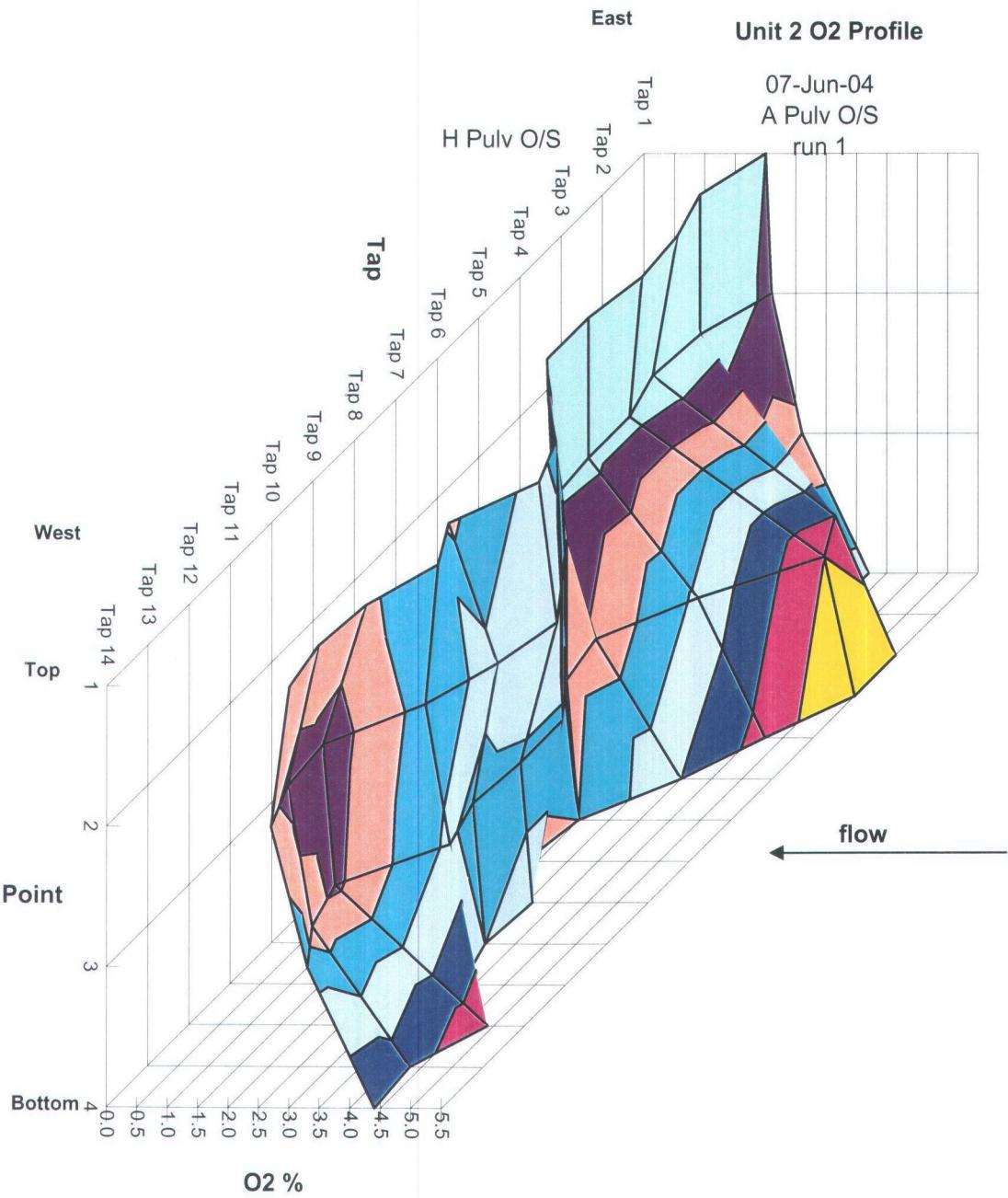
The vendor shall provide a full replacement or refund warranty against failure, malfunction, or substandard performance on all purchased replacement units for a minimum period of two (2) years.

U2 A Pulv o/s 6-7-04 run 1

O2 Profile



IP12_004507



IP12_004508

Final Probe Locations

Final Probe Locations Recommended Probes
E-W Avg Depth Y R

4 Probes/Row - Horizontal Position

1	5 29	5' 4"
2	15 29	15' 3"
3	25 20	25' 3"
4	35 20	35' 3"

3 Probes/ Row - Horizontal Position

1	6.74	6' 9"
2	20 29	20' 4"
3	33.54	33' 6"

Probe Lengths - 4 Rows

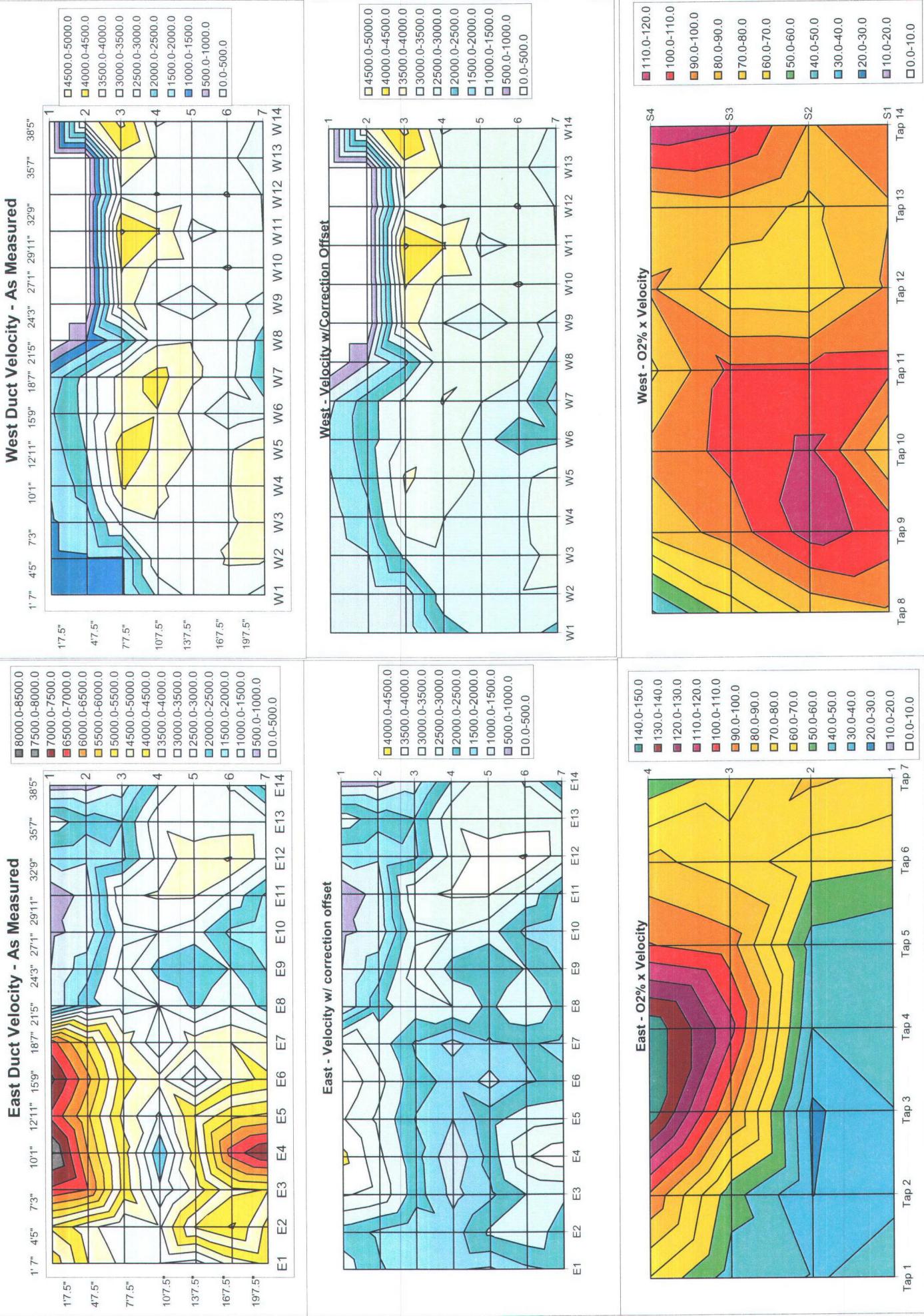
1	3.51	3' 6"	6 5'/2m	6'
2	9 42	9' 5"	11 8'/3 6m	9'
3	14 14	14' 2"	15 7'/4.8m	15'
4	18 85	18' 10"	17 7'/5 4m	18'

Probe Lengths - 3 Rows

1	4.31	4' 4"	6 5'/2m	6'
2	10 44	10' 5"	11 8'/3 6m	12'
3	18 11	18' 1"	17 7'/5 4m	18'

Probe Length - 2 Rows

1	5 91	5' 11"	6.5'/2m	9'
2	16.54	16' 6"	17 7'/5 4m	18'



IP12_004512

	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	Row Zone Avgs
1	1177.0	1200.2	1201.9	1290.8	1454.9	1614.5	1379.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	665.6
2	1231.2	1227.3	1469.1	1887.1	2114.9	2234.0	2255.5	945.0	0.0	0.0	0.0	0.0	0.0	0.0	3591.3
3	1192.1	1197.7	2615.1	3400.1	3568.1	3106.8	3115.2	1855.3	3777.3	4043.7	4558.0	3410.7	3851.7	4634.7	3166.2
4	2195.4	2841.0	2891.0	3012.6	3287.7	3331.3	3520.3	3384.3	3003.0	3341.7	4061.0	2967.3	3460.3	2923.3	3158.6
5	2657.0	2524.5	2757.4	2668.5	2925.4	2647.8	3019.6	3463.7	2657.3	3321.3	2863.7	3260.7	3052.7	3210.7	2930.7
6	2716.3	2987.7	2872.8	2912.0	2886.8	2230.1	2702.3	3249.7	3136.7	3530.0	3056.7	3530.0	3143.7	3434.7	3027.8
7	2335.5	2974.3	3109.1	3298.3	3225.1	2401.2	1739.5	2261.0	2858.3	3290.7	2998.0	2971.0	2631.0	2873.7	2783.3
Col Zone Avgs	1929.2	2136.1	2416.6	2638.5	2780.4	2509.4	2533.2	2165.6	2204.7	2503.9	2505.3	2305.7	2305.6	2952.6	
Probe Location Calcs															
4 zone avg	8471.7														
Area #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Width
Zone Width (ft)	3.00	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	3.00	40.00
	6542.5	4406.4	1989.8	-648.7	5042.6	2533.2	0.0	6306.1	4101.5	1597.5	-907.8	5258.2	2952.6	0.0	
4 probe zone width				10.80			9.20				10.31			9.69	40.00
Probe location (ft)	X1	5.40													
	X2	15.40													
	X3	25.15													
	X4	35.15													
3 zone weight	11295.6														
Area #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Width
Zone Width (ft)	3.00	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	3.00	40.00
	9366.4	7230.3	4813.7	2175.2	-605.2	8181.0	5647.8	3482.2	1277.6	-1226.3	7563.9	5258.2	2952.6	0.0	
3 probe zone width				13.72							13.40			12.89	40.00
Probe location (ft)	X1	6.86													
	X2	20.41													
	X3	33.56													
4 Elevation avg	4235.8														
Elevation #	1	2	3	4	5	6	7								
Row Avg Vel (fpm)	665.6	1211.1	3166.2	3158.6	2930.7	3027.8	2783.3	Height							
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.13								
	3570.2	2359.1	-807.1	270.2	-2660.5	-1452.5	0.0								
4 probe zone depths				2.24		0.28	1.56	3.13	Chk Height						
Probe location (ft)	Y1	4.18				3.51 2' 5"									
	Y2	10.38				9.42 7' 1"									
	Y3	14.54				14 14 11' 10"									
	Y4	18.97				18 85 17' 9"									
3 Elevation avg	5647.8														
Elevation #	1	2	3	4	5	6	7								
Row Avg Vel (fpm)	665.6	1211.1	3166.2	3158.6	2930.7	3027.8	2783.3	Height							
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.13								
	4982.2	3771.1	604.9	-2553.7	163.4	-2864.5	0.0								
3 probe zone depths				0.57		0.16	3.13	Chk Height							
Probe location (ft)	Y1	4.85				4 31 3' 2"									
	Y2	9.78				10 44 9' 6"									
	Y3	18.27				18.11 17'									
2 Elevation avg	8471.7														
Elevation #	1	2	3	4	5	6	7								
Row Avg Vel (fpm)	665.6	1211.1	3166.2	3158.6	2930.7	3027.8	2783.3	Height							
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.13								
	7806.1	6594.9	3428.8	270.2	-2660.5	2783.3	0.0								
2 probe zone depths				0.28		3.13	Chk Height								
Probe location (ft)	Y1	6.20				12.40		8.85							
	Y2	16.83				5.91 4' 9"									

Final Probe Locations

Final Probe Locations Recommended Probes
E-W Avg Depth Y R

4 Probes/Row - Horizontal Position

1	5 29	5' 4"
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Probe Lengths - 4 Rows

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	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	Row Zone	Avg
1	2739.7	2267.2	3549.3	4131.4	3536.6	3915.6	3452.3	1014.3	996.7	904.3	611.0	1644.3	2799.7	732.7	2306.8	
2	2050.0	1886.7	3338.2	3086.2	2872.4	3165.0	2759.9	2319.7	1803.0	1138.3	1206.0	1544.0	2233.3	776.7	2155.7	
3	1718.8	1566.8	2216.5	2166.1	1972.2	2165.2	1917.2	2774.0	3221.3	2866.7	3419.7	1882.7	2005.7	1246.3	2224.2	
4	1535.2	1770.9	1334.9	1052.9	1494.7	1872.8	1308.2	2995.7	2302.3	2989.0	3553.7	3132.0	3383.0	2505.0	2230.7	
5	1425.0	2595.8	1894.9	2188.7	2325.1	1323.1	1912.6	2391.0	2044.7	2721.0	3541.7	3841.0	3114.3	3447.0	2483.3	
6	1907.9	2855.6	2516.3	3456.6	2771.9	1959.8	2053.7	2974.7	2529.0	1887.3	2888.3	4034.3	3202.0	2963.3	2714.4	
7	2102.7	2221.4	2580.2	3858.2	2889.1	2103.7	1891.3	2311.7	1979.7	1610.3	1892.3	3258.7	3223.3	1820.0	2410.2	
Col Zone Avgs	1925.6	2166.4	2490.0	2848.6	2551.7	2357.9	2185.0	2397.3	2125.2	2016.7	2444.7	2762.4	2851.6	1927.3		
Probe Location Calcs																
4 zone avg	8262.6															
Area #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Width	
Zone Width (ft)	3.00	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	3.00	40.00	
	6337.0	4170.7	1680.6	-1168.0	4542.9	2185.0	0.0	5865.3	3740.1	1723.4	-721.3	4778.9	1927.3	0.0		
				1.67			2.83				2.00			3.00	Chk Width	
4 probe zone width				10.34			9.66				10.50			9.50	40.00	
Probe location (ft)	X1 X2 X3 X4	5.17 15.17 25.25 35.25														
3 zone weight	11016.8															
Area #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Width	
Zone Width (ft)	3.00	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	3.00	40.00	
	9091.2	6924.9	4434.8	1586.2	-965.5	7693.4	5508.4	3111.1	985.9	-1030.8	7541.3	4778.9	1927.3	0.0		
				1.76						1.39				3.00	Chk Width	
3 probe zone width				13.26							13.79			12.95	40.00	
Probe location (ft)	X1 X2 X3	6.63 20.16 33.53														
4 Elevation avg	4131.3															
Elevation #	1	2	3	4	5	6	7									
Row Avg Vel (fpm)	2306.8	2155.7	2224.2	2230.7	2483.3	2714.4	2410.2									
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.13									
	1824.5	-331.2	1575.9	-654.8	993.2	-1721.1	0.0									
			2.54	2.12		1.10	3.13								Chk Height	
4 probe zone depths	5.66		5.58		4.98	5.03										
Probe location (ft)	Y1 Y2 Y3 Y4	2.83 8.45 13.73 18.74														
3 Elevation avg	5508.4															
Elevation #	1	2	3	4	5	6	7									
Row Avg Vel (fpm)	2306.8	2155.7	2224.2	2230.7	2483.3	2714.4	2410.2									
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.13									
	3201.6	1045.9	-1178.3	2099.4	-383.9	2410.2	0.0									
			1.41	2.54		3.13									Chk Height	
3 probe zone depths	7.54			7.13		6.59										
Probe location (ft)	Y1 Y2 Y3	3.77 11.10 17.96														
2 Elevation avg	8262.6															
Elevation #	1	2	3	4	5	6	7									
Row Avg Vel (fpm)	2306.8	2155.7	2224.2	2230.7	2483.3	2714.4	2410.2									
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.13									
	5955.8	3800.1	1575.9	-654.8	5124.5	2410.2	0.0									
			2.12			3.13									Chk Height	
2 probe zone depths	11.24				10.01											
Probe location (ft)	Y1 Y2	5.62 16.25														

	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	Row Zone Avgs
1	1177.0	1200.2	1201.9	1290.8	1454.9	1614.5	1379.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	665.6
2	1231.2	1227.3	1469.1	1887.1	2114.9	2234.0	2255.5	945.0	0.0	0.0	0.0	0.0	0.0	0.0	3591.3
3	1192.1	1197.7	2615.1	3400.1	3568.1	3106.8	3115.2	1855.3	3777.3	4043.7	4558.0	3410.7	3851.7	4634.7	3166.2
4	2195.4	2841.0	2891.0	3012.6	3287.7	3331.3	3520.3	3384.3	3003.0	3341.7	4061.0	2967.3	3460.3	2923.3	3158.6
5	2657.0	2524.5	2757.4	2668.5	2925.4	2647.8	3019.6	3463.7	2657.3	3321.3	2863.7	3260.7	3052.7	3210.7	2930.7
6	2716.3	2987.7	2872.8	2912.0	2886.8	2230.1	2702.3	3249.7	3136.7	3530.0	3056.7	3530.0	3143.7	3434.7	3027.8
7	2335.5	2974.3	3109.1	3298.3	3225.1	2401.2	1739.5	2261.0	2858.3	3290.7	2998.0	2971.0	2631.0	2873.7	2783.3
Col Zone Avgs	1929.2	2136.1	2416.6	2638.5	2780.4	2509.4	2533.2	2165.6	2204.7	2503.9	2505.3	2305.7	2305.6	2952.6	
Probe Location Calcs															
4 zone avg	8471.7														
Area #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Width
Zone Width (ft)	3.00	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	3.00	40.00
	6542.5	4406.4	1989.8	-648.7	5042.6	2533.2	0.0	6306.1	4101.5	1597.5	-907.8	5258.2	2952.6	0.0	
				2.14			2.83				1.81			3.00	Chk Width
4 probe zone width					10.80			9.20				10.31		9.69	40.00
Probe location (ft)	X1 X2 X3 X4	5.40 15.40 25.15 35.15			15.29 25.20 35.20										
3 zone weight	11295.6														
Area #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Width
Zone Width (ft)	3.00	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	3.00	40.00
	9366.4	7230.3	4813.7	2175.2	-605.2	8181.0	5647.8	3482.2	1277.6	-1226.3	7563.9	5258.2	2952.6	0.0	
					2.22					1.45				3.00	Chk Width
3 probe zone width					13.72				13.40					12.89	40.00
Probe location (ft)	X1 X2 X3	6.86 20.41 33.56			6.74 20.29 33.54										
4 Elevation avg	4235.8														
Elevation #	1	2	3	4	5	6	7								
Row Avg Vel (fpm)	665.6	1211.1	3166.2	3158.6	2930.7	3027.8	2783.3	Height							
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.00		3.13	21.25					
	3570.2	2359.1	-807.1	270.2	-2660.5	-1452.5	0.0								
				2.24		0.28	1.56	3.13	Chk.Height						
4 probe zone depths				8.36		4.04	4.28	4.56		21.25					
Probe location (ft)	Y1 Y2 Y3 Y4	4.18 10.38 14.54 18.97			3.51 2' 5" 9.42 7' 1" 14.14 11' 10" 18.85 17' 9"										
3 Elevation avg	5647.8														
Elevation #	1	2	3	4	5	6	7								
Row Avg Vel (fpm)	665.6	1211.1	3166.2	3158.6	2930.7	3027.8	2783.3	Height							
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.00		3.13	21.25					
	4982.2	3771.1	604.9	-2553.7	163.4	-2864.5	0.0								
					0.57	0.16	3.13	Chk Height							
3 probe zone depths				9.70		5.59	5.96		21.25						
Probe location (ft)	Y1 Y2 Y3	4.85 9.78 18.27			4.31 3' 2" 10.44 9' 6" 18.11 17'										
2 Elevation avg	8471.7														
Elevation #	1	2	3	4	5	6	7								
Row Avg Vel (fpm)	665.6	1211.1	3166.2	3158.6	2930.7	3027.8	2783.3	Height							
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.00		3.13	21.25					
	7806.1	6594.9	3428.8	270.2	-2660.5	2783.3	0.0								
					0.28		3.13	Chk Height							
2 probe zone depths				12.40		8.85		21.25							
Probe location (ft)	Y1 Y2	6.20 16.83			5.91 4' 9" 16.54 16' 6"										

Final Probe Locations

Final Probe Locations Recommended Probes
E-W Avg Depth Y R

4 Probes/Row - Horizontal Position

1	5 29	5' 4"
2	15 29	15' 3"
3	25 20	25' 3"
4	35 20	35' 3"

3 Probes/ Row - Horizontal Position

1	6 74	6' 9"
2	20 29	20' 4"
3	33 54	33' 6"

Probe Lengths - 4 Rows

1	3 51	3' 6"	6 5/2m	6'
2	9.42	9' 5"	11 8/3 6m	9'
3	14 14	14' 2"	15 7/4 8m	15'
4	18 85	18' 10"	17 7/5 4m	18'

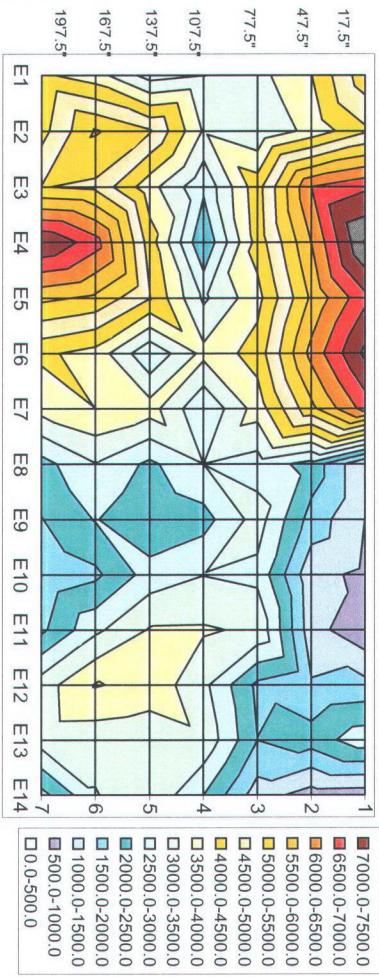
Probe Lengths - 3 Rows

1	4 31	4' 4"	6.5/2m	6'
2	10.44	10' 5"	11 8/3 6m	12'
3	18 11	18' 1"	17 7/5 4m	18'

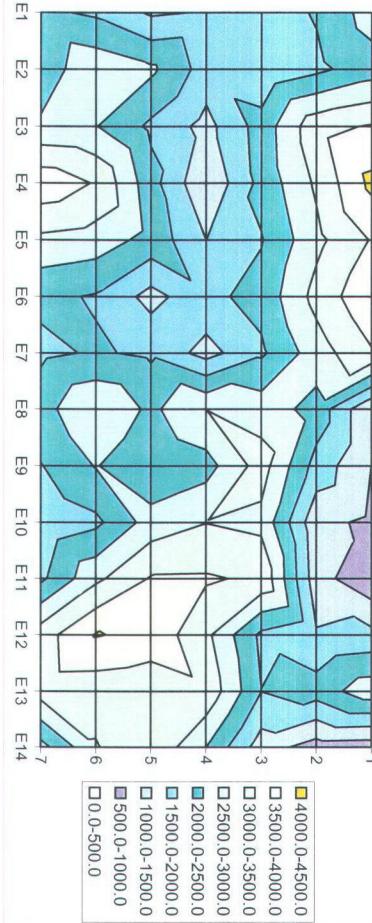
Probe Length - 2 Rows

1	5 91	5' 11"	6 5/2m	9'
2	16 54	16' 6"	17.7/5.4m	18'

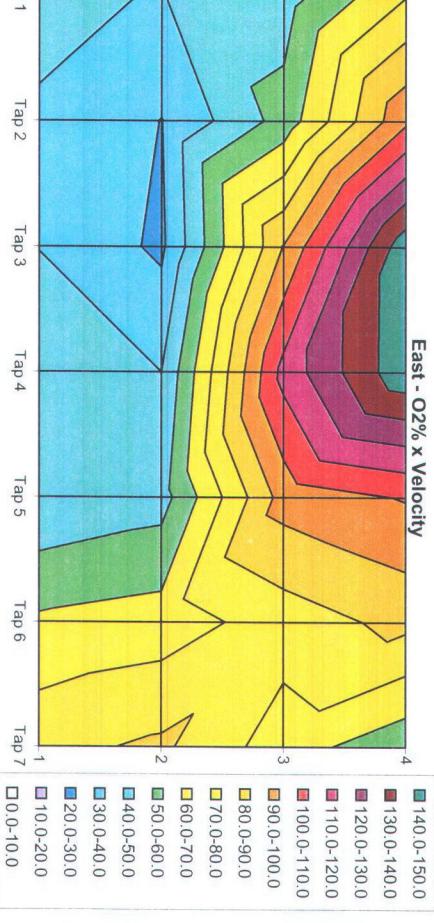
East Duct Velocity - As Measured



East - Velocity w/ correction offset

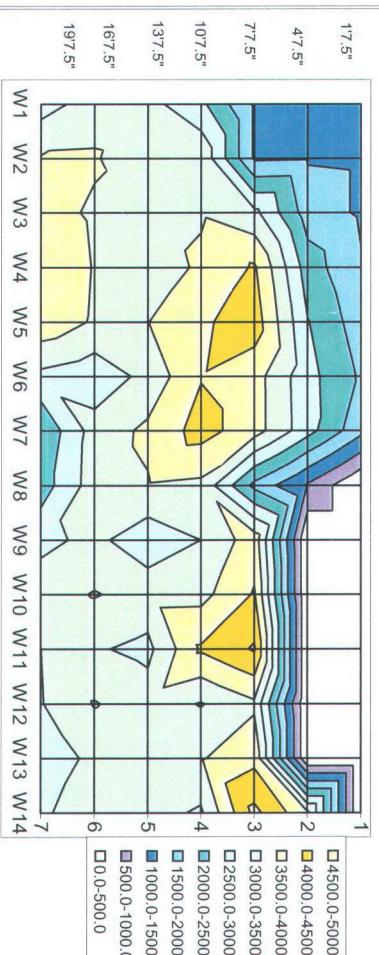


East - O2% x Velocity

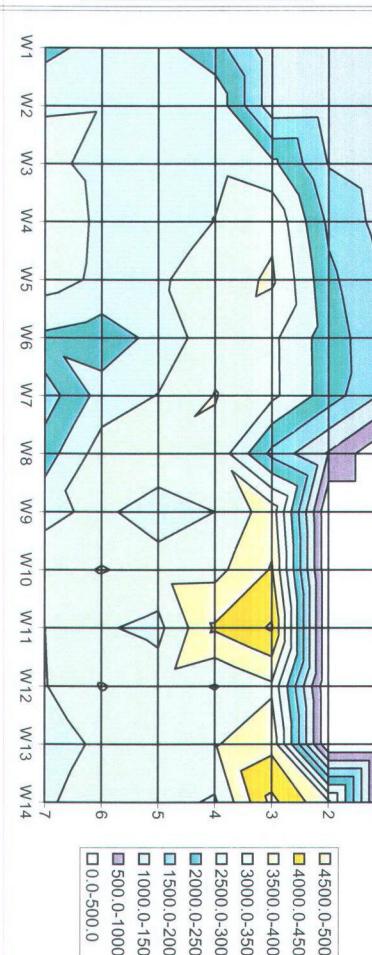


Tap 1 Tap 2 Tap 3 Tap 4 Tap 5 Tap 6 Tap 7

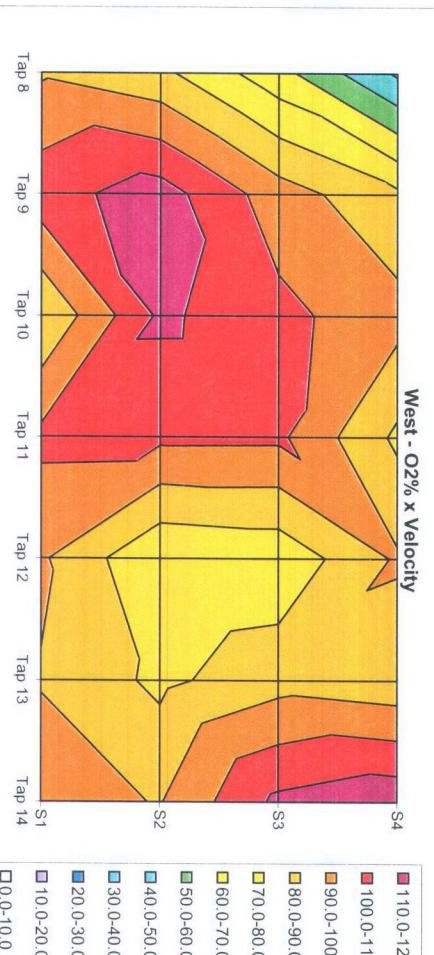
West Duct Velocity - As Measured



West - Velocity w/Correction Offset

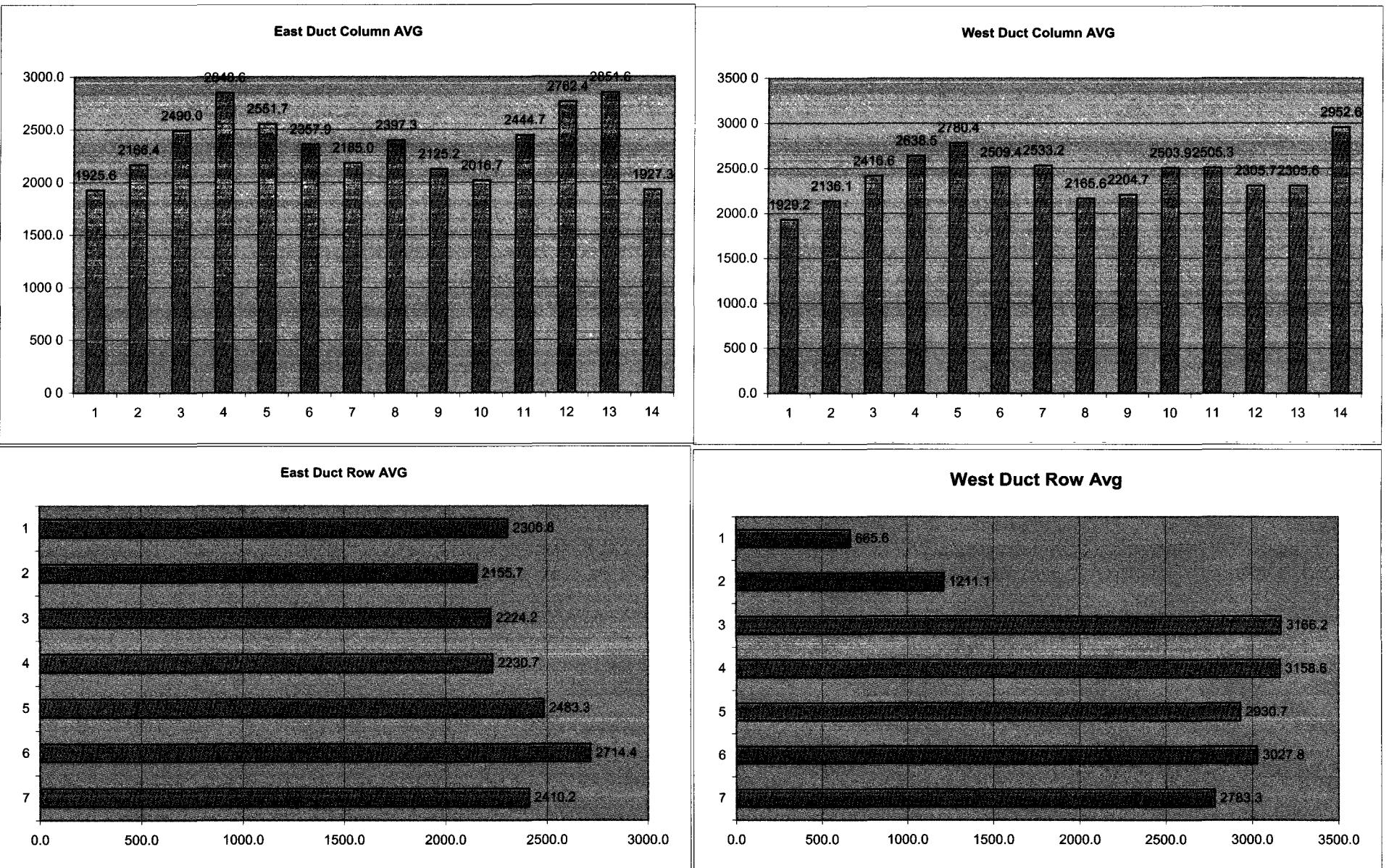


West - O2% x Velocity

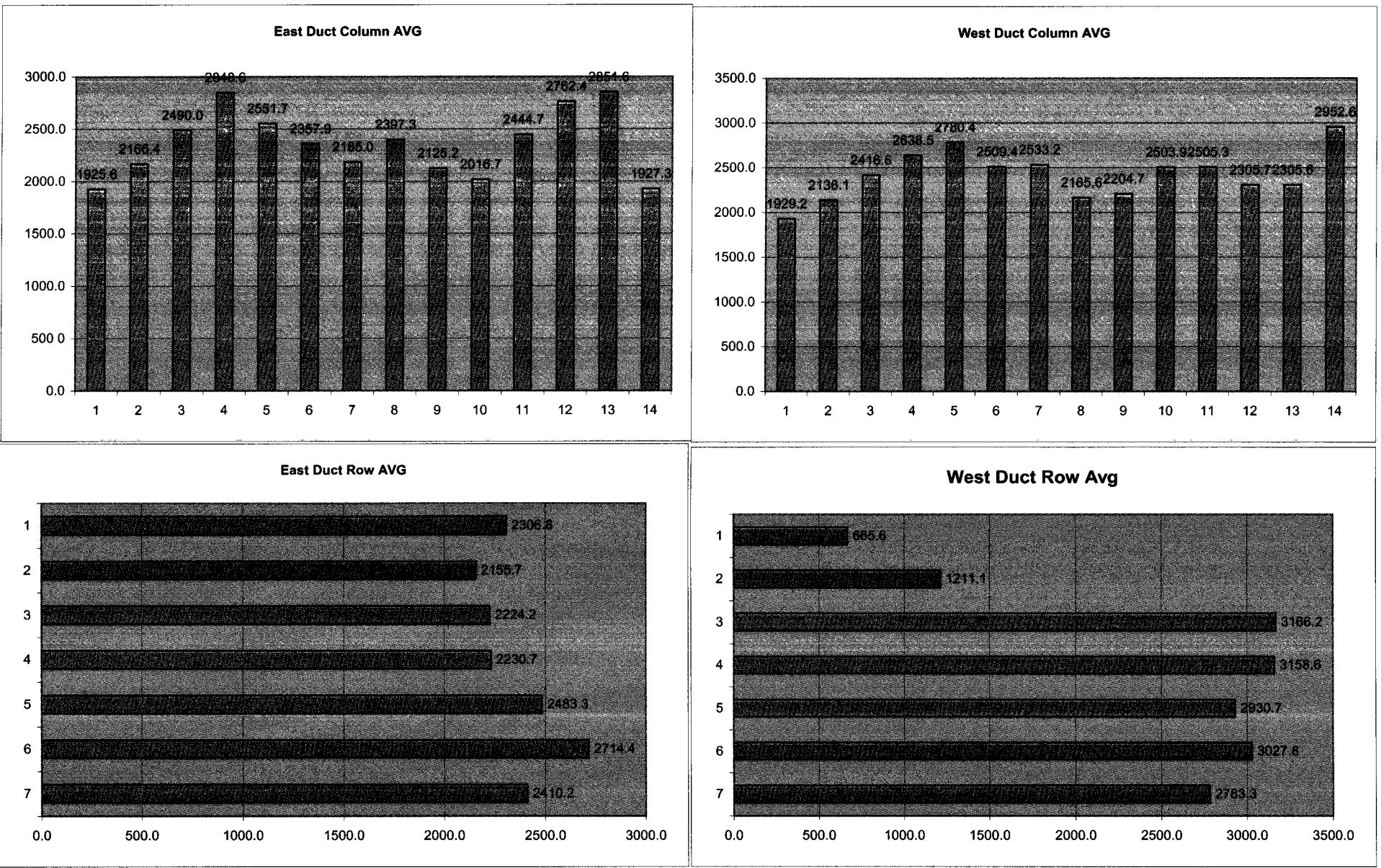


Tap 8 Tap 9 Tap 10 Tap 11 Tap 12 Tap 13 Tap 14

S1 S2 S3 S4



IP12_004520



IGS04-08 - O2 Replacement Project

November 4, 2004

Meeting to Discuss Proposed Project Scope Expansion

Agenda:

- (1) Original Proposal
 - a. Option 1: Original Justification for 16 Probes in 4-4 x 2 (8x2) configuration redesigned to 3-3-2 x 2.
- (2) Proposed Expansion:
 - a. Option 2: 3-3-3 x 2 installation - requires 2 additional probes and one multiplexer/calibration unit.
 - b. Option 3: 3-3-3-3 x 2 installation - requires 8 additional probes and one or two (depending on vendor) multiplexer/calibration units.
- (3) Justification
Initial - Reliability
Performance required/requested.
- (4) Determination of Probe Lengths - Dependent on quantity and configuration of probes.

	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	
7	2739.7	2267.2	3549.3	4131.4	3536.6	3915.6	3452.3	1014.3	996.7	904.3	611.0	1644.3	2799.7	732.7	2306.8
6	2050.0	1886.7	3338.2	3086.2	2872.4	3165.0	2759.9	2319.7	1803.0	1138.3	1206.0	1544.0	2233.3	776.7	2155.7
5	1718.8	1566.8	2216.5	2166.1	1972.2	2165.2	1917.2	2774.0	3221.3	2866.7	3419.7	1882.7	2005.7	1246.3	2224.2
4	1535.2	1770.9	1334.9	1052.9	1494.7	1872.8	1308.2	2995.7	2302.3	2989.0	3553.7	3132.0	3383.0	2505.0	2230.7
3	1425.0	2595.8	1894.9	2188.7	2325.1	1323.1	1912.6	2391.0	2044.7	2721.0	3541.7	3841.0	3114.3	3447.0	2483.3
2	1907.9	2855.6	2516.3	3456.6	2771.9	1959.8	2053.7	2974.7	2529.0	1887.3	2888.3	4034.3	3202.0	2963.3	2714.4
1	2102.7	2221.4	2580.2	3858.2	2889.1	2103.7	1891.3	2311.7	1979.7	1610.3	1892.3	3258.7	3223.3	1820.0	2410.2
Zone Averages	1925.6	2166.4	2490.0	2848.6	2551.7	2357.9	2185.0	2397.3	2125.2	2016.7	2444.7	2762.4	2851.6	1927.3	

Probe Location Calcs

4 zone avg 8262.6

Area # 1 2 3 4 5 6 7 8 9 10 11 12 13 14

Zone Width (ft)	3.00	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	3.00	40.00
	6337.0	4170.7	1680.6	-1168.0	4542.9	2185.0	0.0	5865.3	3740.1	1723.4	-721.3	4778.9	1927.3	0.0

4 probe zone width	10.34	9.66	10.50	9.50
Probe location (ft)	X1 5.17	X2 10.3	X3 9.2	X4 10.31
	<i>10.5</i>	<i>~ 9.5</i>	<i>~ 10.5</i>	<i>~ 9.5</i>

3 zone weight	11016.8													
Area #	1 2 3 4 5 6 7 8 9 10 11 12 13 14													
Zone Width (ft)	3.00 2.83 2.83 2.83 2.83 2.83 2.83 2.83 2.83 2.83 2.83 2.83 2.83 2.83 3.00													40.00

3 probe zone width	13.26	13.79	12.95
Probe location (ft)	X1 6.63	X2 13.72	X3 13.5

4 Elevation avg	4131.3													
Elevation #	1 2 3 4 5 6 7													
Row Avg Vel (fpm)	2306.8 2155.7 2224.2 2230.7 2483.3 2714.4 2410.2													
Zone height	3.13 3.00 3.00 3.00 3.00 3.00 3.13													21.25
	1824.5 -331.2 1575.9 -654.8 993.2 -1721.1 0.0													
4 probe zone depths	5.66 5.58 4.98 5.03													21.25
Probe location (ft)	Y1 2.83 8.36 4.04 4.28 4.56	Y2 8.45 10.0 13.5 13.5 13.5	Y3 13.73 14.75 14.75 14.75 14.75	Y4 18.74										

3 Elevation avg	5508.4													
Elevation #	1 2 3 4 5 6 7													
Row Avg Vel (fpm)	2306.8 2155.7 2224.2 2230.7 2483.3 2714.4 2410.2													21.25
Zone height	3.13 3.00 3.00 3.00 3.00 3.00 3.13													
	3201.6 1045.9 -1178.3 2099.4 -383.9 2410.2 0.0													
3 probe zone depths	7.54 7.13 6.59													21.25
Probe location (ft)	Y1 3.77 9.7 5.51 5.96	Y2 11.10 8 6.5 6.5	Y3 17.96											

2 Elevation avg	8262.6													
Elevation #	1 2 3 4 5 6 7													
Row Avg Vel (fpm)	2306.8 2155.7 2224.2 2230.7 2483.3 2714.4 2410.2													21.25
Zone height	3.13 3.00 3.00 3.00 3.00 3.00 3.13													
	5955.8 3800.1 1575.9 -654.8 5124.5 2410.2 0.0													
2 probe zone depths	11.24 10.01													21.25
Probe location (ft)	Y1 5.62 12.4 8.85	Y2 16.25 12 9												

	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14	
7	1177.0	1200.2	1201.9	1290.8	1454.9	1614.5	1379.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	665.6
6	1231.2	1227.3	1469.1	1887.1	2114.9	2234.0	2255.5	945.0	0.0	0.0	0.0	0.0	0.0	0.0	3591.3
5	1192.1	1197.7	2615.1	3400.1	3568.1	3106.8	3115.2	1855.3	3777.3	4043.7	4558.0	3410.7	3851.7	4634.7	1211.1
4	2195.4	2841.0	2891.0	3012.6	3287.7	3331.3	3520.3	3384.3	3003.0	3341.7	4061.0	2967.3	3460.3	2923.3	3166.2
3	2657.0	2524.5	2757.4	2668.5	2925.4	2647.8	3019.6	3463.7	2657.3	3321.3	2863.7	3260.7	3052.7	3210.7	3158.6
2	2716.3	2987.7	2872.8	2912.0	2886.8	2230.1	2702.3	3249.7	3136.7	3530.0	3056.7	3530.0	3143.7	3434.7	2930.7
1	2335.5	2974.3	3109.1	3298.3	3225.1	2401.2	1739.5	2261.0	2858.3	3290.7	2998.0	2971.0	2631.0	2873.7	3027.8
	1929.2	2136.1	2416.6	2638.5	2780.4	2509.4	2533.2	2165.6	2204.7	2503.9	2505.3	2305.7	2305.6	2952.6	2783.3

Probe Location Calcs

4 zone avg	8471.7														
Area #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Zone Width (ft)	3.00	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	3.00	40.00
	6542.5	4406.4	1989.8	-648.7	5042.6	2533.2	0.0	6306.1	4101.5	1597.5	-907.8	5258.2	2952.6	0.0	
				2.14				2.83				1.81		3.00	
4 probe zone width				10.80				9.20				10.31		9.69	40.00

Probe location (ft)	X1 X2 X3 X4	5.40 15.40 25.15 35.15													
			15.29												
				25.20											
					35.20										

3 zone weight	11295.6														
Area #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Zone Width (ft)	3.00	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	3.00	40.00
	9366.4	7230.3	4813.7	2175.2	-605.2	8181.0	5647.8	3482.2	1277.6	-1226.3	7563.9	5258.2	2952.6	0.0	
					2.22						1.45			3.00	
3 probe zone width				13.72							13.40			12.89	40.00

Probe location (ft)	X1 X2 X3	6.86 20.41 33.56													
			6.74												
				20.29											
					33.54										

4 Elevation avg	4235.8														
Elevation #	1	2	3	4	5	6	7								
Row Avg Vel (fpm)	665.6	1211.1	3166.2	3158.6	2930.7	3027.8	2783.3								
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.13								
	3570.2	2359.1	-807.1	270.2	-2660.5	-1452.5	0.0								
				2.24		0.28	1.56				3.13				
4 probe zone depths				8.36			4.04	4.28	4.56					21.25	

Probe location (ft)	Y1 Y2 Y3 Y4	4.18 10.38 14.54 18.97													
			3.51 2' 5"												
				9.42 7' 1"											
					14.14 11' 10"										
						18.85 17' 9"									

3 Elevation avg	5647.8														
Elevation #	1	2	3	4	5	6	7								
Row Avg Vel (fpm)	665.6	1211.1	3166.2	3158.6	2930.7	3027.8	2783.3								
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.13								
	4982.2	3771.1	604.9	-2553.7	163.4	-2864.5	0.0								
					0.57		0.16				3.13				
3 probe zone depths				9.70			5.59	5.96						21.25	

Probe location (ft)	Y1 Y2 Y3	4.85 9.78 18.27													
			4.31 3' 2"												
				10.44 9' 6"											
					18.11 17'										

2 Elevation avg	8471.7														
Elevation #	1	2	3	4	5	6	7								
Row Avg Vel (fpm)	665.6	1211.1	3166.2	3158.6	2930.7	3027.8	2783.3								
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.13								
	7806.1	6594.9	3428.8	270.2	-2660.5	2783.3	0.0								
					0.28		3.13								
2 probe zone depths				12.40			8.85							21.25	

Probe location (ft)	Y1 Y2	6.20 16.83													
			5.91 4' 9"												
				16.54 16' 6"											

Final Probe Locations

Final Probe Locations Recommended Probes
E-W Avg Depth Y R

4 Probes/Row - Horizontal Position

1	5.29	5' 4"
2	15.29	15' 3"
3	25.20	25' 3"
4	35.20	35' 3"

3 Probes/ Row - Horizontal Position

1	6.74	6' 9"
2	20.29	20' 4"
3	33.54	33' 6"

Probe Lengths - 4 Rows

1	3.51	3' 6"	6.5'/2m	6'
2	9.42	9' 5"	11.8'/3.6m	9'
3	14.14	14' 2"	15.7'/4.8m	15'
4	18.85	18' 10"	17.7'/5.4m	18'

Probe Lengths - 3 Rows

1	4.31	4' 4"	6.5'/2m	6'
2	10.44	10' 5"	11.8'/3.6m	12'
3	18.11	18' 1"	17.7'/5.4m	18'

Probe Length - 2 Rows

1	5.91	5' 11"	6.5'/2m	9'
2	16.54	16' 6"	17.7'/5.4m	18'

	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	Row Zone Avgs
Col Zone Avgs.	2739.7	2267.2	3549.3	4131.4	3536.6	3915.6	3452.3	1014.3	996.7	904.3	611.0	1644.3	2799.7	732.7	2306.8
1	2050.0	1886.7	3338.2	3086.2	2872.4	3165.0	2759.9	2319.7	1803.0	1138.3	1206.0	1544.0	2233.3	776.7	2155.7
2	1718.8	1566.8	2216.5	2166.1	1972.2	2165.2	1917.2	2774.0	3221.3	2866.7	3419.7	1882.7	2005.7	1246.3	2224.2
3	1535.2	1770.9	1334.9	1052.9	1494.7	1872.8	1308.2	2995.7	2302.3	2989.0	3553.7	3132.0	3383.0	2505.0	2230.7
4	1425.0	2595.8	1894.9	2188.7	2325.1	1323.1	1912.6	2391.0	2044.7	2721.0	3541.7	3841.0	3114.3	3447.0	2483.3
5	1907.9	2855.6	2516.3	3456.6	2771.9	1959.8	2053.7	2974.7	2529.0	1887.3	2888.3	4034.3	3202.0	2963.3	2714.4
6	2102.7	2221.4	2580.2	3858.2	2889.1	2103.7	1891.3	2311.7	1979.7	1610.3	1892.3	3258.7	3223.3	1820.0	2410.2
7															
Col Zone Avgs.	1925.6	2166.4	2490.0	2848.6	2551.7	2357.9	2185.0	2397.3	2125.2	2016.7	2444.7	2762.4	2851.6	1927.3	

Probe Location Calcs

4 zone avg	8262.6														
Area #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Width
Zone Width (ft)	3.00	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	3.00	40.00
	6337.0	4170.7	1680.6	-1168.0	4542.9	2185.0	0.0	5865.3	3740.1	1723.4	-721.3	4778.9	1927.3	0.0	
4 probe zone width				1.67			2.83				2.00			3.00	Chk Width

Probe location (ft)	X1	5.17													
	X2	15.17													
	X3	25.25													
	X4	35.25													

3 zone weight	11016.8														
Area #	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Width
Zone Width (ft)	3.00	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	2.83	3.00	40.00
	9091.2	6924.9	4434.8	1586.2	-965.5	7693.4	5508.4	3111.1	985.9	-1030.8	7541.3	4778.9	1927.3	0.0	
3 probe zone width				1.76							1.39			3.00	Chk Width

Probe location (ft)	X1	6.63													
	X2	20.16													
	X3	33.53													

4 Elevation avg	4131.3														
Elevation #	1	2	3	4	5	6	7								
Row Avg Vel (fpm)	2306.8	2155.7	2224.2	2230.7	2483.3	2714.4	2410.2								
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.13								
	1824.5	-331.2	1575.9	-654.8	993.2	-1721.1	0.0								
4 probe zone depths	5.66		5.58		4.98	5.03									21.25

Probe location (ft)	Y1	2.83													
	Y2	8.45													
	Y3	13.73													
	Y4	18.74													

3 Elevation avg	5508.4														
Elevation #	1	2	3	4	5	6	7								
Row Avg Vel (fpm)	2306.8	2155.7	2224.2	2230.7	2483.3	2714.4	2410.2								
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.13								
	3201.6	1045.9	-1178.3	2099.4	-383.9	2410.2	0.0								
			1.41		2.54		3.13								Chk Height
3 probe zone depths			7.54		7.13		6.59								21.25

Probe location (ft)	Y1	3.77													
	Y2	11.10													
	Y3	17.96													

2 Elevation avg	8262.6														
Elevation #	1	2	3	4	5	6	7								
Row Avg Vel (fpm)	2306.8	2155.7	2224.2	2230.7	2483.3	2714.4	2410.2								
Zone height	3.13	3.00	3.00	3.00	3.00	3.00	3.13								
	5955.8	3800.1	1575.9	-654.8	5124.5	2410.2	0.0								
				2.12			3.13								Chk Height
2 probe zone depths				11.24			10.01								21.25

Final Probe Locations

Final Probe Locations Recommended Probes
E-W Avg Depth Y R

4 Probes/Row - Horizontal Position

1	5 29	5' 4"
2	15 29	15' 3"
3	25 20	25' 3"
4	35 20	35' 3"

3 Probes/ Row - Horizontal Position

1	6 74	6' 9"
2	20.29	20' 4"
3	33 54	33' 6"

Probe Lengths - 4 Rows

1	3 51	3' 6"	6 5'/2m	6'
2	9 42	9' 5"	11.8'/3.6m	9'
3	14 14	14' 2"	15 7'/4.8m	15'
4	18.85	18' 10"	17 7'/5.4m	18'

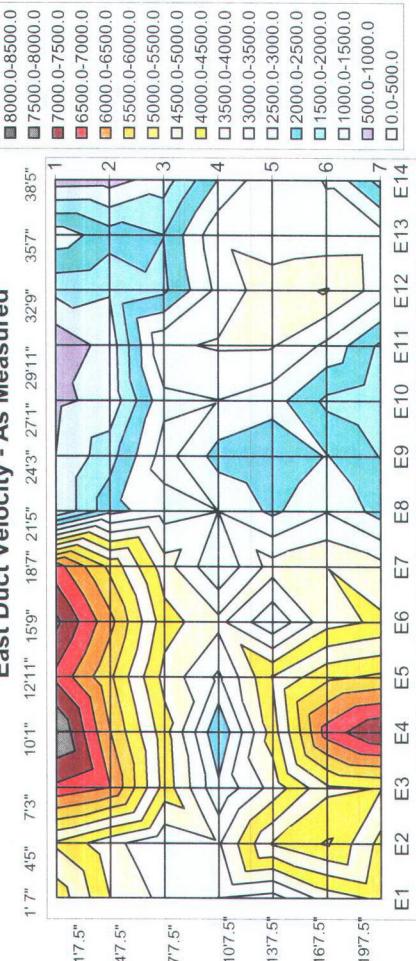
Probe Lengths - 3 Rows

1	4 31	4' 4"	6 5'/2m	6'
2	10 44	10' 5"	11 8'/3.6m	12'
3	18.11	18' 1"	17 7'/5.4m	18'

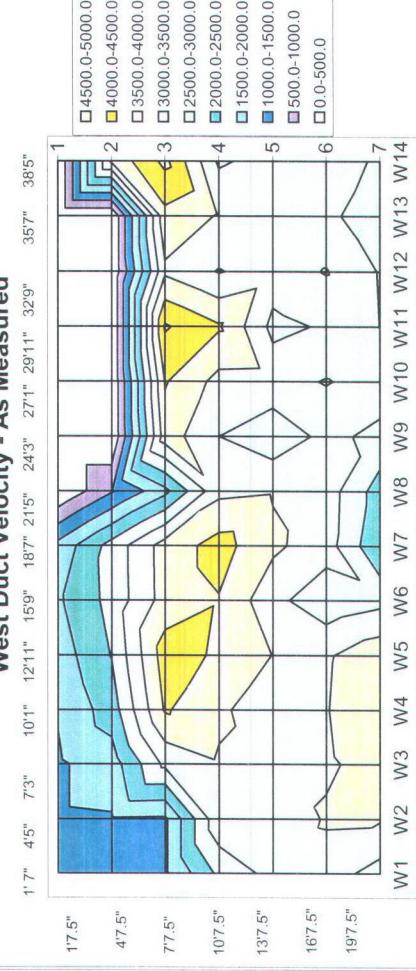
Probe Length - 2 Rows

1	5 91	5' 11"	6 5'/2m	9'
2	16 54	16' 6"	17 7'/5.4m	18'

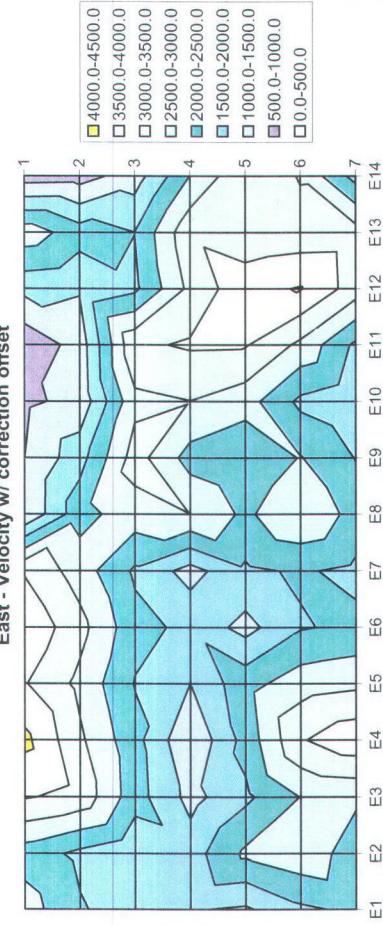
East Duct Velocity - As Measured



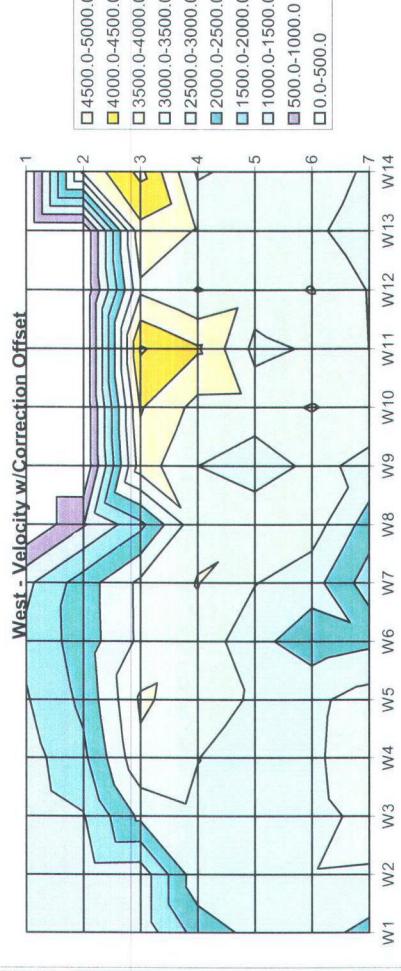
West Duct Velocity - As Measured



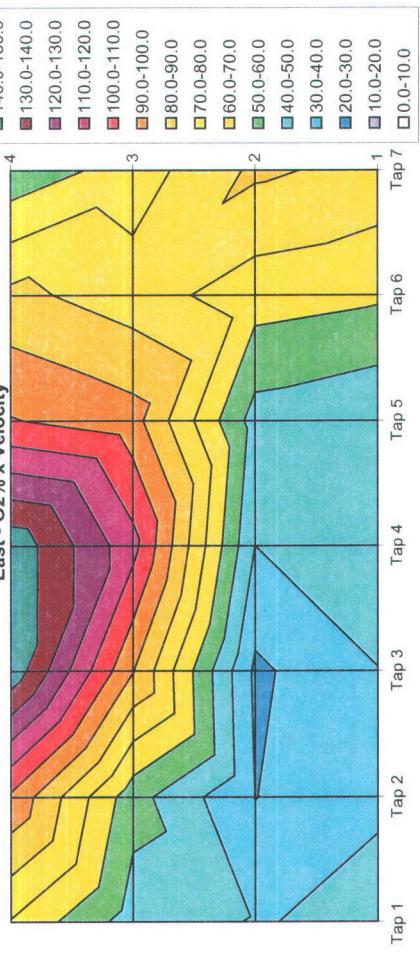
East - Velocity w/ correction offset



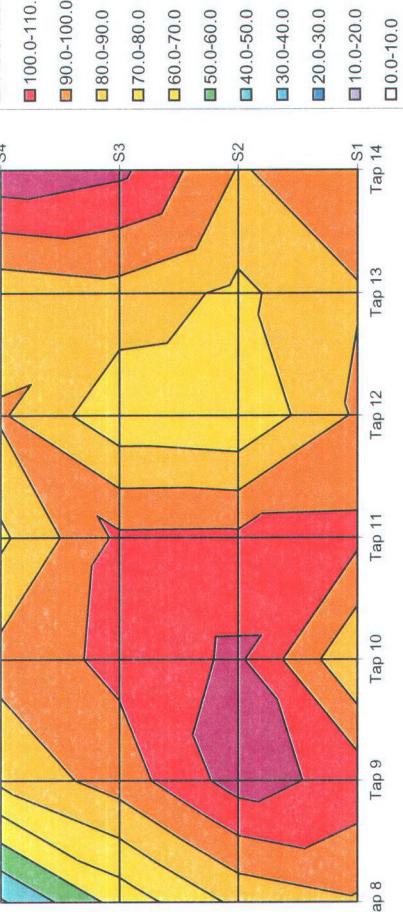
West - Velocity w/Correction Offset



East - O2% x Velocity

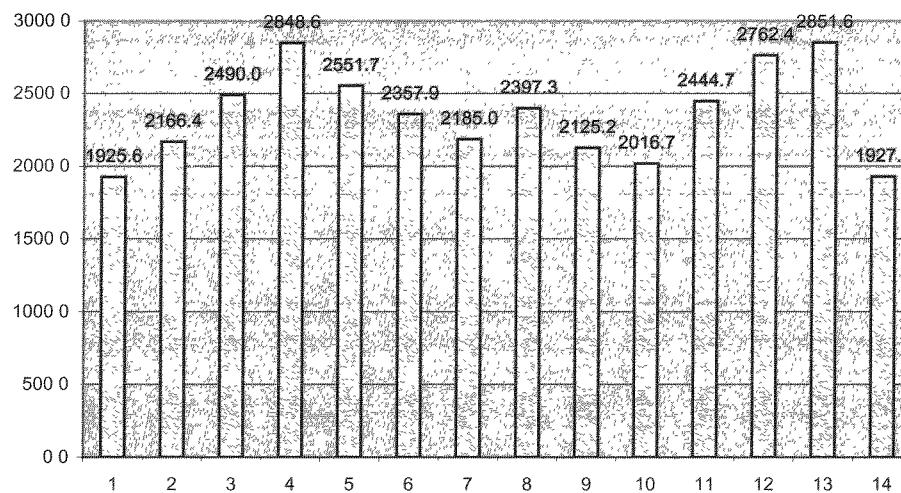


West - O2% x Velocity

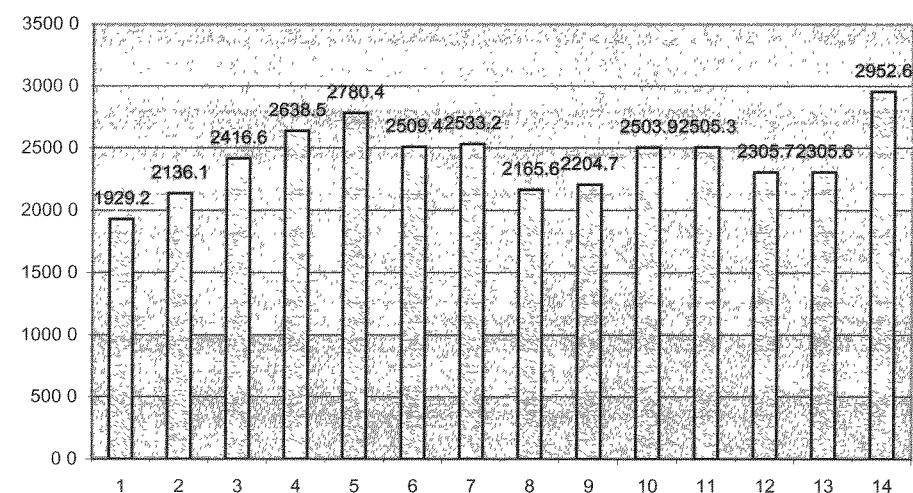


IP12_004530

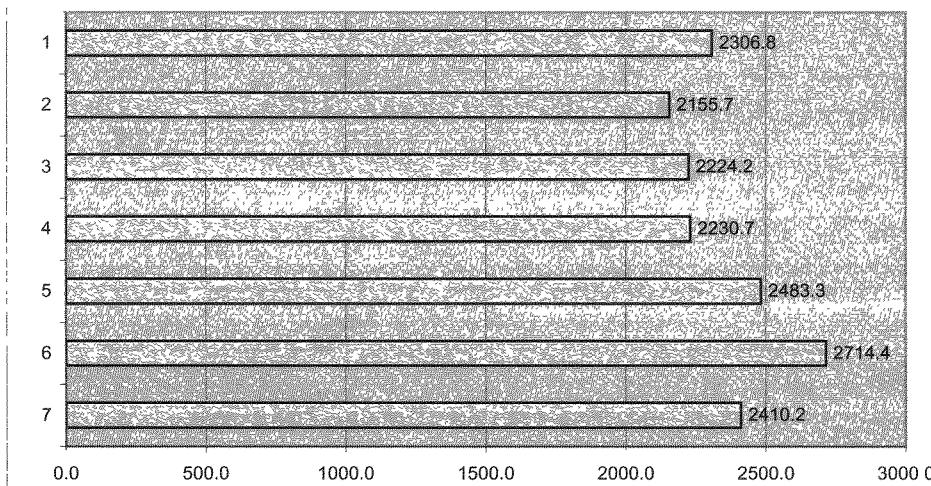
East Duct Column AVG



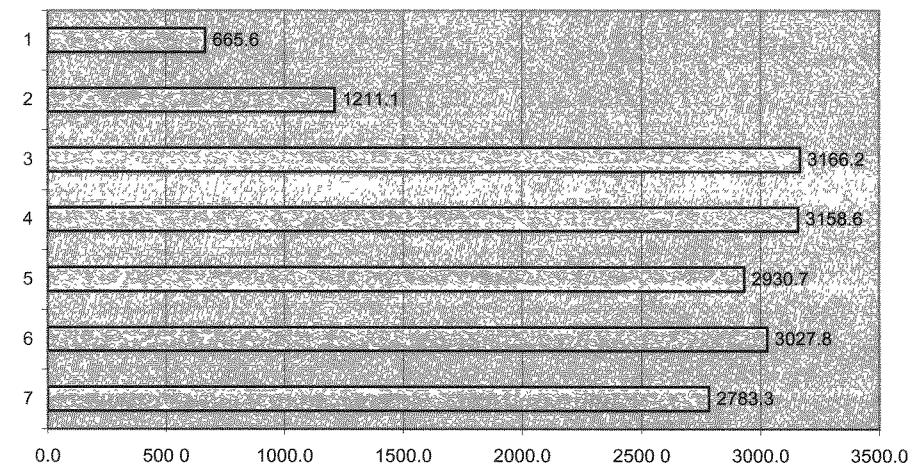
West Duct Column AVG



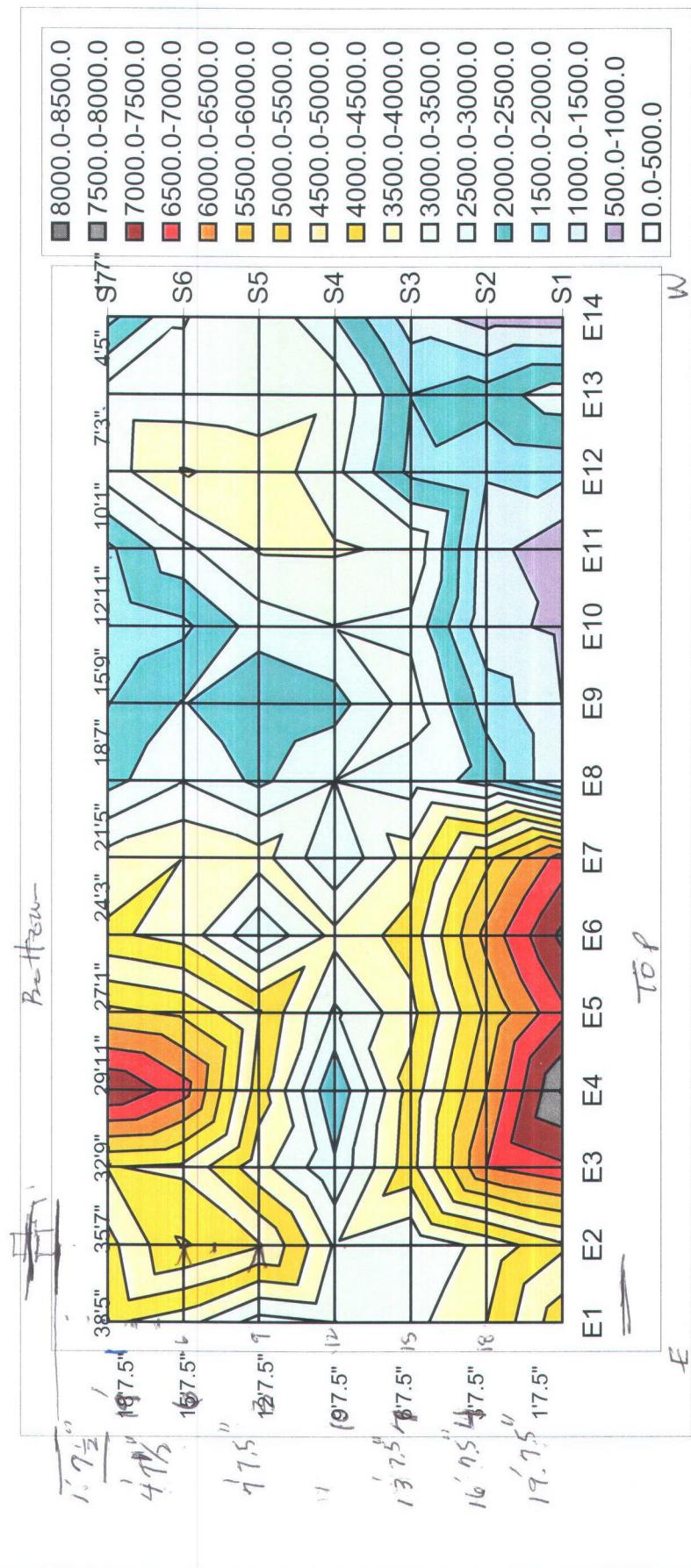
East Duct Row AVG



West Duct Row Avg



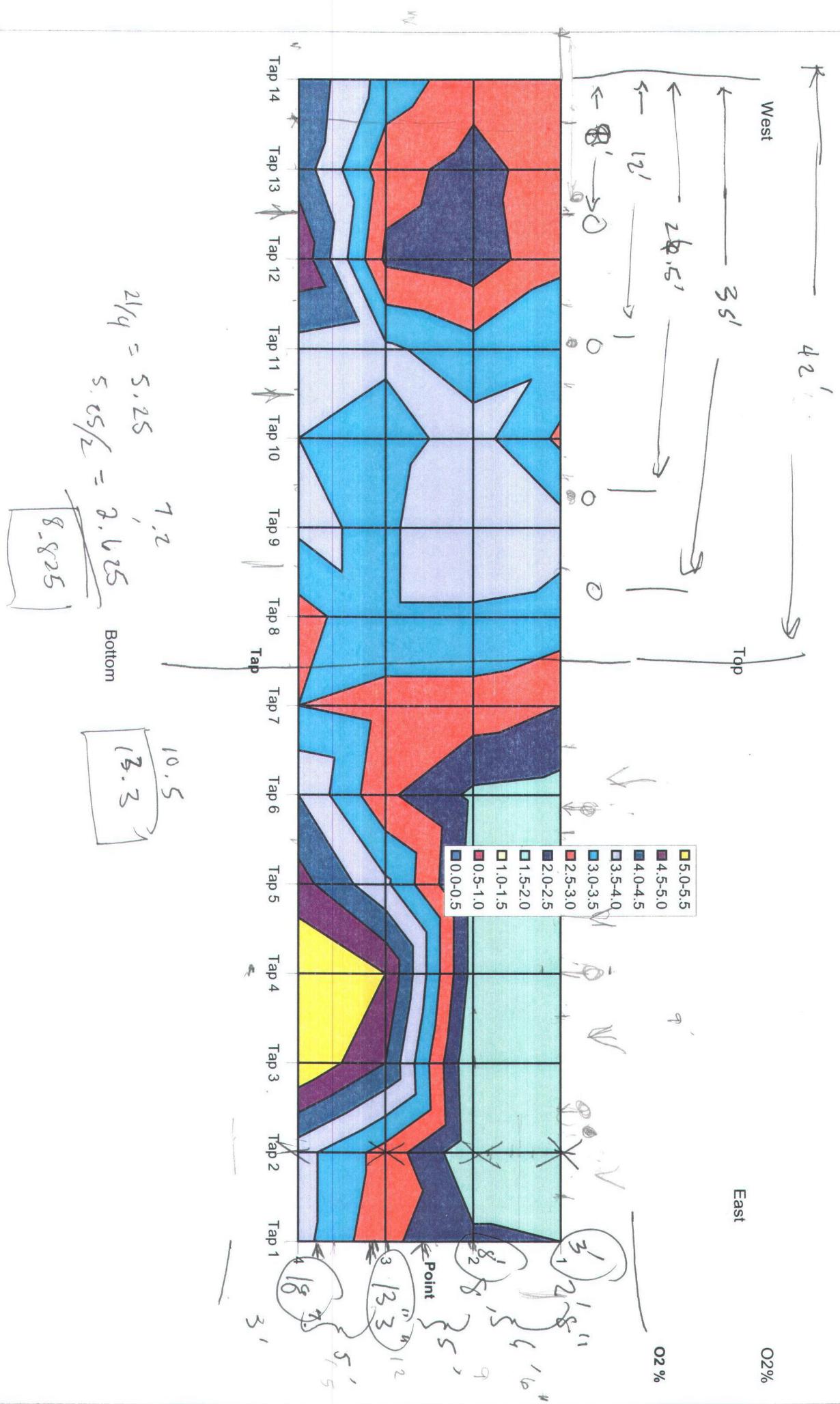
E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14
5330.7	4411.3	6906.0	8038.7	6881.3	7618.7	6717.3	1014.3	996.7	904.3	611.0	1644.3	2799.7	732.7
3988.7	3671.0	6495.3	6005.0	5589.0	6158.3	5370.0	2319.7	1803.0	1138.3	1206.0	1544.0	2233.3	776.7
3344.3	3048.7	4312.7	4214.7	3837.3	4213.0	3730.3	2774.0	3221.3	2866.7	3419.7	1882.7	2005.7	1246.3
2987.0	3445.7	2597.3	2048.7	2908.3	3644.0	2545.3	2995.7	2302.3	2989.0	3553.7	3132.0	3383.0	2505.0
2772.7	5050.7	3687.0	4258.7	4524.0	2574.3	3721.3	2391.0	2044.7	2721.0	3541.7	3841.0	3114.3	3447.0
3712.3	5556.3	4896.0	6725.7	5393.3	3813.3	3996.0	2974.7	2529.0	1887.3	2888.3	4034.3	3202.0	2963.3
4091.3	4322.3	5020.3	7507.0	5621.3	4093.3	3680.0	2311.7	1979.7	1610.3	1892.3	3258.7	3223.3	1820.0

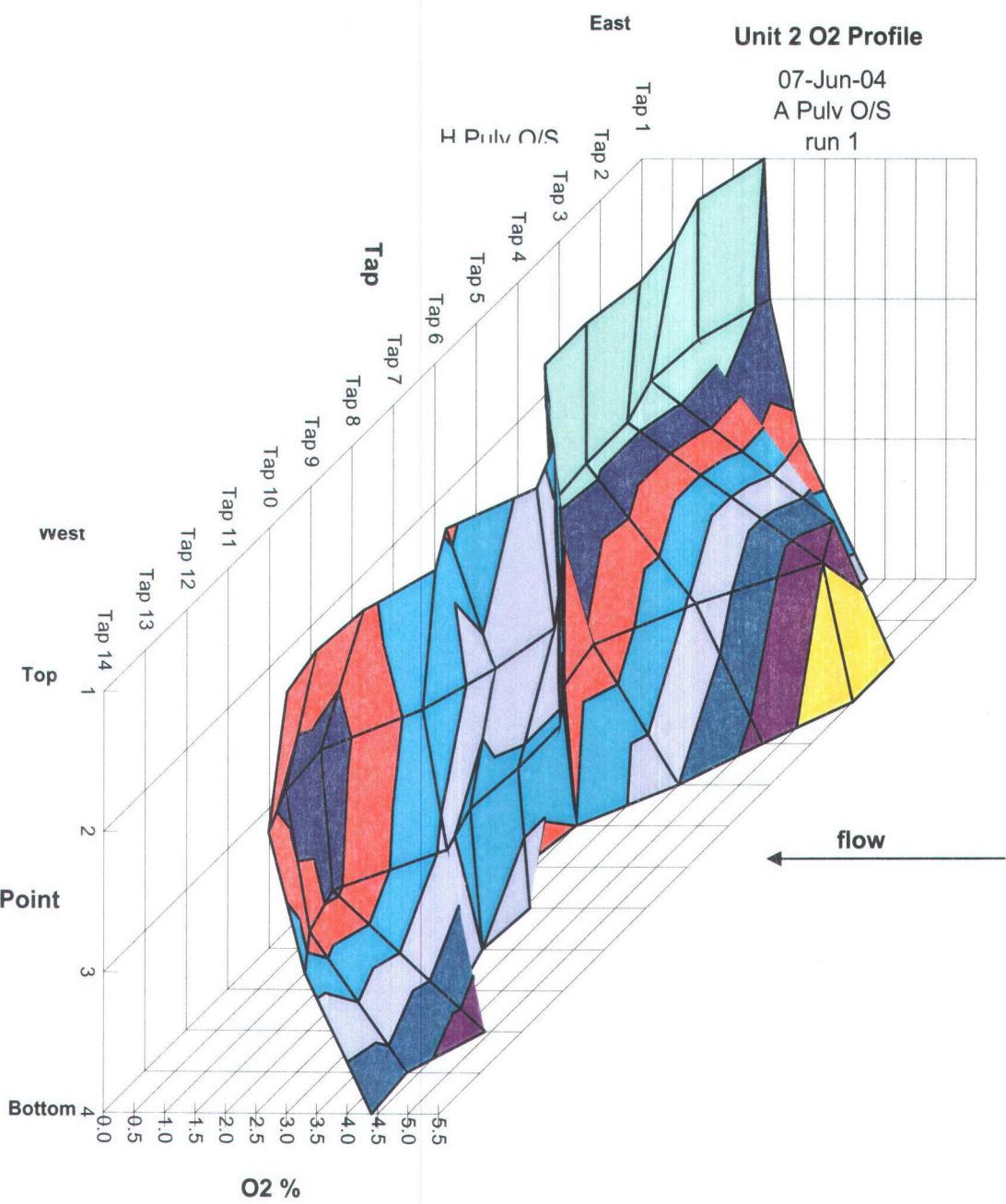


IP12_004531

29' 12''
19' 7.5''
/ 7.5''

O2 Profile





IP12_004533

Unit 2 Start Time 6/7/2004 12:45 End Time 6/7/2004 13:35

A Pulv o/s run 1

NOx 0.296

% O2 East Duct							East	Avg
Tap 7	Tap 6	Tap 5	Tap 4	Tap 3	Tap 2	Tap 1		
2.5	1.8	1.8	2.0	1.9	1.6	2.0		1.94
2.8	1.9	1.8	1.8	1.5	1.6	2.1		1.93
2.8	2.6	3.6	5.0	4.5	2.8	2.6		3.41
3.0	4.0	4.7	6.2	5.7	3.7	3.7		4.43
Column Averages								
2.78	2.58	2.98	3.75	3.40	2.43	2.60		

Avg %O2 East = 2.93 Hi %O2 = 6.20 Lo % O2 = 1.50 O2 Range = 4.70

% O2 West Duct							East	Avg
Tap 14	Tap 13	Tap 12	Tap 11	Tap 10	Tap 9	Tap 8		
3.0	2.8	2.9	3.4	2.9	3.7	3.3		3.14
2.7	2.3	2.2	3.2	3.7	4.0	3.4		3.07
3.3	2.7	2.4	3.6	3.3	3.4	3.4		3.16
4.4	4.3	4.9	3.8	3.5	3.6	2.8		3.90
Column Averages								
3.35	3.03	3.10	3.50	3.35	3.68	3.23		

Avg %O2 West = 3.32 Hi %O2 = 4.9 Lo % O2 = 2.2 O2 Range = 2.7

Whole Duct Information

Avg %O2 = 3.12 Hi %O2 = 6.20 Lo % O2 = 1.50 O2 Range = 4.7

	Tap 1	Tap 2	Tap 3	Tap 4	Tap 5	Tap 6	Tap 7	Tap 8	Tap 9	Tap 10	Tap 11	Tap 12	Tap 13	Tap 14
1	2.0	1.6	1.9	2.0	1.8	1.8	2.5	3.3	3.7	2.9	3.4	2.9	2.8	3.0
2	2.1	1.6	1.5	1.8	1.8	1.9	2.8	3.4	4.0	3.7	3.2	2.2	2.3	2.7
3	2.6	2.8	4.5	5.0	3.6	2.6	2.8	3.4	3.4	3.3	3.6	2.4	2.7	3.3
4	3.7	3.7	5.7	6.2	4.7	4.0	3.0	2.8	3.6	3.5	3.8	4.9	4.3	4.4

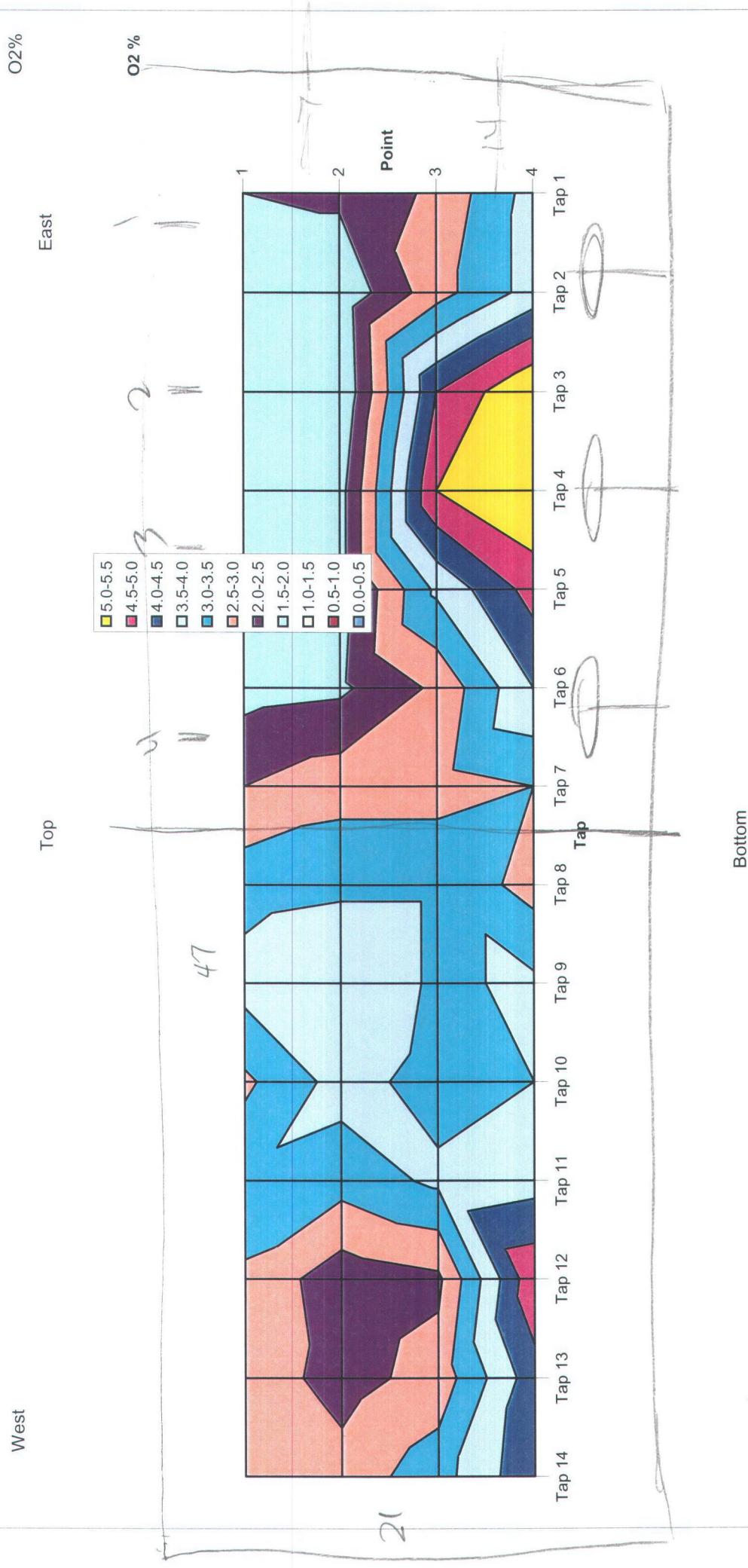
Unit 2	Start Time	6/7/2004 12:45	End Time	6/7/2004 13:35	START TIME	END TIME
					6/7/2004 12:45	6/7/2004 13:35
West						
Probe 4A	Probe 3A	% O2 East Duct	Probe 2A		Probe 1A	Probe 1A
1.72	1.66		1.46	1.42	Probe 2A	2SGAAZ0030
Avg %O2 East =	0.00			1.42	Probe 3A	2SGAAZ0031
West						
Probe 4B	Probe 3B	% O2 West Duct	Probe 2B		Probe 4A	2SGAAZ0032
2.13	2.16		2.95	3.00	Probe 1B	2SGAAZ0033
Avg %O2 West =	2.31			3.00	Probe 2B	2SGAAZ0034
East						
				East	Probe 3B	2SGAAZ0035
				West	Probe 4B	2SGAAZ0036
				Total Air	2COAXI079A	2.16
				NOx	2COAXI080A	2.13
				ID Suction	2COAXI078s	82.12
					NOx	0.30
					ID Suction	2COAXI084A
						-16.96

Conclusion:

O2 % appears to be running approx. .5% higher than readings from the COSA probes. The heat rate deviation for this is approx. 14 Btu/Kwhr. This correlates to approx \$12,500 lost per month per unit due to excess air only, not including increase fan horsepower, extra sprays and sootblowing to maintain unit operation.

U2 A Pulv o/s 6-7-04 run 1

O2 Profile



IP12_004537

6/26/87

Alt Alt Test, Egan Loc

LOCATION = EASTPRIGASOUT
FILE IDENTITY = IP6_25EPMG

AVERAGE VELOCITY = 1752 FPM

AVERAGE (WEIGHTED) % O2 = 7.19 *

AVERAGE (WEIGHTED) % CO2 = 12.34 *

AVERAGE (WEIGHTED) TEMPERATURE = 293

AVERAGE (ARITHMETIC) % O2 = 6.89 *

AVERAGE (ARITHMETIC) % CO2 = 12.61 *

AVERAGE (ARITHMETIC) TEMPERATURE = 295

AVERAGE STATIC PRESSURE (in. H2O) = -8.0

AVERAGE DENSITY (LBM/FT³) = .04455

ACFM (ACTUAL FT³/MIN) = 157873

LB/HR (WET) = 421989

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED

NO. OF POINTS NOT USED = 0 OUT OF 12

IP12_004538

DATE = 6/25/1987
 LOCATION = ECON WEST A_G
 FILE IDENTITY = IP6_25EWA
 BAROMETRIC PRESSURE = 25.53
 PROBE IDENTITY = E43
 DUCT HEIGHT = 21.2
 DUCT WIDTH = 20.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
1	1	-3.6	731	.039	0	5.0	14.5
1	2	-3.5	744	.039	-5	4.8	14.6
1	3	-3.4	739	.040	0	5.0	14.3
1	4	-3.3	729	.333	35	3.7	15.3
1	5	-3.2	726	.346	35	4.0	15.1
1	6	-3.3	730	.315	20	3.9	15.3
1	7	-3.4	739	.245	30	3.9	15.3
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
2	1	-3.3	712	.041	0	6.3	13.2
2	2	-3.5	746	.041	5	5.2	14.2
2	3	-3.4	746	.041	10	3.4	15.7
2	4	-3.5	742	.227	25	3.4	15.8
2	5	-3.3	735	.329	25	3.0	16.2
2	6	-3.6	736	.324	20	3.4	15.6
2	7	-3.4	736	.266	25	3.4	15.8
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
3	1	-3.3	722	.041	0	6.8	13.0
3	2	-3.4	751	.060	10	4.3	14.9
3	3	-3.4	758	.295	20	4.6	14.7
3	4	-3.3	745	.342	35	2.8	16.4
3	5	-3.3	750	.258	25	2.8	16.4
3	6	-3.2	745	.275	20	2.8	16.6
3	7	-3.3	743	.312	10	2.9	16.0
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
4	1	-3.4	743	.051	0	4.8	14.4
4	2	-3.3	757	.092	25	4.6	14.8
4	3	-3.3	759	.383	20	5.1	14.2
4	4	-3.2	751	.308	30	2.5	16.6
4	5	-3.3	739	.288	40	2.9	16.3
4	6	-3.3	739	.273	20	2.1	16.9
4	7	-3.2	743	.346	0	3.1	16.3

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
5	1	-3.3	756	.053	5	4.0	15.4
5	2	-3.5	757	.082	10	4.5	14.7
5	3	-3.3	758	.398	10	5.0	14.4
5	4	-3.1	746	.366	15	2.6	16.6
5	5	-3.1	737	.240	25	2.8	16.4
5	6	-3.1	741	.258	20	3.6	15.8
5	7	-3.2	741	.312	5	* 3.0	*15.8

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
6	1	-3.6	749	.051	5	3.0	16.2
6	2	-3.5	756	.180	0	3.5	15.6
6	3	-3.4	758	.385	0	3.1	16.0
6	4	-3.5	747	.358	10	3.4	15.9
6	5	-3.3	741	.258	20	3.0	16.4
6	6	-3.3	747	.201	30	3.7	15.7
6	7	-3.4	742	.126	0	3.3	15.8

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
7	1	-3.4	707	.051	5	6.5	13.1
7	2	-3.4	758	.105	0	4.6	14.7
7	3	-3.5	759	.493	15	3.4	16.0
7	4	-3.4	750	.344	5	3.8	15.4
7	5	-3.5	753	.273	5	3.4	15.8
7	6	-3.3	758	.278	20	3.9	15.4
7	7	-3.4	757	.151	30	3.9	15.1

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED

 PRELIMINARY CALCULATIONS !!!!!!!
 FINAL CALCULATIONS TO BE RUN AFTER
 FECHHEIMER PROBES ARE
 INDEPENDENTLY CALIBRATED

DATE - 6/25/1987
 LOCATION - ECON WEST A_G
 FILE IDENTITY - IP6_25EWA
 BAROMETRIC PRESSURE - 25.53
 PROBE IDENTITY - E43
 DUCT AREA - 425.0

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
1	1	1358	5.0	14.5	.48/.47	2.4	6.9	346
1	2	1360	4.8	14.6	.48/.47	2.3	7.0	352
1	3	1380	5.0	14.3	.48/.48	2.4	6.9	355
1	4	3222	3.7	15.3	1.13/1.12	4.2	17.3	817
1	5	3280	4.0	15.1	1.15/1.14	4.6	17.4	829
1	6	3597	3.9	15.3	1.26/1.25	4.9	19.3	914
1	7	2939	3.9	15.3	1.03/1.02	4.0	15.8	756

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
2	1	1382	6.3	13.2	.48/.48	3.1	6.4	343
2	2	1396	5.2	14.2	.49/.49	2.5	6.9	362
2	3	1378	3.4	15.7	.48/.48	1.6	7.6	358
2	4	2963	3.4	15.8	1.04/1.03	3.5	16.4	765
2	5	3550	3.0	16.2	1.24/1.24	3.7	20.2	909
2	6	3658	3.4	15.6	1.28/1.27	4.4	20.0	937
2	7	3198	3.4	15.8	1.12/1.11	3.8	17.7	819

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
3	1	1388	6.8	13.0	.49/.48	3.3	6.3	349
3	2	1671	4.3	14.9	.59/.58	2.5	8.7	437
3	3	3526	4.6	14.7	1.24/1.23	5.7	18.2	931
3	4	3283	2.8	16.4	1.15/1.14	3.2	18.9	851
3	5	3165	2.8	16.4	1.11/1.10	3.1	18.2	826
3	6	3379	2.8	16.6	1.18/1.18	3.3	19.7	876
3	7	3772	2.9	16.0	1.32/1.31	3.8	21.1	976

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
4	1	1560	4.8	14.4	.55/.54	2.6	7.9	404
4	2	1906	4.6	14.8	.67/.66	3.1	9.9	502
4	3	4017	5.1	14.2	1.41/1.40	7.2	20.0	1062
4	4	3303	2.5	16.6	1.16/1.15	2.9	19.2	863
4	5	2813	2.9	16.3	.99/.98	2.9	16.1	723
4	6	3359	2.1	16.9	1.18/1.17	2.5	19.9	864
4	7	4028	3.1	16.3	1.41/1.40	4.4	23.0	1042

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
5	1	1591	4.0	15.4	.56/.55	2.2	8.6	419
5	2	1957	4.5	14.7	.69/.68	3.1	10.1	516
5	3	4287	5.0	14.4	1.50/1.49	7.5	21.6	1131
5	4	4005	2.6	16.6	1.40/1.39	3.6	23.3	1040
5	5	3037	2.8	16.4	1.06/1.06	3.0	17.5	779
5	6	3270	3.6	15.8	1.15/1.14	4.1	18.1	843
5	7	3812	3.0	15.8	1.34/1.33	0.0	0.0	984

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
6	1	1556	3.0	16.2	.55/.54	1.6	8.8	406
6	2	2933	3.5	15.6	1.03/1.02	3.6	16.0	772
6	3	4277	3.1	16.0	1.50/1.49	4.6	24.0	1129
6	4	4044	3.4	15.9	1.42/1.41	4.8	22.5	1051
6	5	3269	3.0	16.4	1.15/1.14	3.4	18.8	843
6	6	2671	3.7	15.7	.94/.93	3.5	14.7	694
6	7	2441	3.3	15.8	.86/.85	2.8	13.5	630

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
7	1	1532	6.5	13.1	.54/.53	3.5	7.0	377
7	2	2248	4.6	14.7	.79/.78	3.6	11.6	593
7	3	4671	3.4	16.0	1.64/1.63	5.6	26.2	1234
7	4	4019	3.8	15.4	1.41/1.40	5.4	21.7	1050
7	5	3587	3.4	15.8	1.26/1.25	4.3	19.9	940
7	6	3420	3.9	15.4	1.20/1.19	4.7	18.5	902
7	7	2329	3.9	15.1	.82/.81	3.2	12.3	614

LOCATION = ECON WEST A_G
FILE IDENTITY = IP6_25EWA

AVERAGE VELOCITY = 2873 FPM

AVERAGE (WEIGHTED) % O2 = 3.67 *
AVERAGE (WEIGHTED) % CO2 = 15.57 *
AVERAGE (WEIGHTED) TEMPERATURE = 745

AVERAGE (ARITHMETIC) % O2 = 3.86 *
AVERAGE (ARITHMETIC) % CO2 = 15.39 *
AVERAGE (ARITHMETIC) TEMPERATURE = 744

AVERAGE STATIC PRESSURE (in. H2O) = -3.4
AVERAGE DENSITY (LBM/FT^3) = .02844

ACFM (ACTUAL FT^3/MIN) = 1221122
LB/HR (WET) = 2084065

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED
NO. OF POINTS NOT USED = 1 OUT OF 49

IP12_004543

LOCATION = ECON WEST A_G
FILE IDENTITY = IP6_25EWA

AVERAGE VELOCITY = 2873 FPM

AVERAGE (WEIGHTED) % O2 = 3.65

AVERAGE (WEIGHTED) % CO2 = 15.57

AVERAGE (WEIGHTED) TEMPERATURE = 745

AVERAGE (ARITHMETIC) % O2 = 3.85

AVERAGE (ARITHMETIC) % CO2 = 15.40

AVERAGE (ARITHMETIC) TEMPERATURE = 744

AVERAGE STATIC PRESSURE (in. H2O) = -3.4

AVERAGE DENSITY (LBM/FT^3) = .02844

ACFM (ACTUAL FT^3/MIN) = 1221122

LB/HR (WET) = 2084065

DATE = 6/26/1987
 LOCATION = ECON WEST
 FILE IDENTITY = IP6_25EWH
 BAROMETRIC PRESSURE = 25.53
 PROBE IDENTITY = E6
 DUCT HEIGHT = 21.2
 DUCT WIDTH = 20.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
1	1	-2.6	685	0.000	20	8.9	11.0
1	2	-2.5	758	0.000	20	4.4	14.6
1	3	-2.9	771	.600	40	3.4	15.4
1	4	-2.9	752	.451	30	3.8	15.3
1	5	-2.8	757	.383	15	3.4	15.8
1	6	-3.0	763	.317	10	3.7	15.7
1	7	-2.7	762	.014	15	* 3.8	*14.8

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
2	1	-2.6	691	0.000	20	7.3	12.4
2	2	-2.6	764	0.000	20	* 4.3	*14.4
2	3	-2.8	765	.539	25	3.8	15.2
2	4	-2.8	765	.429	30	3.4	15.8
2	5	-2.8	762	.346	20	3.5	15.7
2	6	-2.8	764	.258	5	4.1	15.1
2	7	-2.7	764	.324	20	3.8	15.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
3	1	-2.4	751	0.000	0	7.3	12.1
3	2	-2.6	760	0.000	0	3.6	15.2
3	3	-2.7	768	.510	30	4.2	14.8
3	4	-2.8	755	.439	25	4.1	14.9
3	5	-2.6	762	.383	35	4.2	15.0
3	6	-2.7	759	.356	30	4.1	15.1
3	7	-2.5	761	.280	20	* 3.7	*14.9

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
4	1	-2.5	726	0.000	0	6.5	13.0
4	2	-2.6	761	0.000	0	3.9	15.3
4	3	-2.7	758	.495	25	4.0	15.0
4	4	-2.8	756	.429	35	4.1	15.2
4	5	-2.6	754	.163	20	4.4	14.8
4	6	-2.6	756	.312	35	4.4	14.8
4	7	-2.7	756	.290	30	4.3	15.1

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
5	1	-2.5	730	0.000	0	7.3	12.2
5	2	-2.6	751	0.000	20	4.5	14.7
5	3	-2.8	749	.522	45	4.0	15.2
5	4	-2.7	752	.419	50	4.9	14.3
5	5	-2.8	752	.405	50	4.5	14.7
5	6	-2.7	752	.376	30	4.6	14.6
5	7	-2.7	749	.373	20	4.5	14.5
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
6	1	-2.5	755	0.000	0	4.8	14.2
6	2	-2.7	760	0.000	20	4.8	14.5
6	3	-2.8	751	.600	35	4.5	14.7
6	4	-2.8	758	.510	45	4.6	14.4
6	5	-2.9	754	.444	50	4.4	14.7
6	6	-2.9	689	.371	35	4.5	14.7
6	7	-2.8	753	.266	10	3.9	14.9
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
7	1	-2.6	656	0.000	20	4.8	14.4
7	2	-2.7	767	1.001	10	4.5	14.7
7	3	-2.7	757	.739	15	4.7	14.5
7	4	-2.6	763	.163	10	5.0	14.2
7	5	-2.8	758	.422	50	4.3	14.9
7	6	-2.7	748	.419	40	4.2	15.2
7	7	-2.7	752	.278	20	4.2	14.8

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED

PRELIMINARY CALCULATIONS !!!!!!!
FINAL CALCULATIONS TO BE RUN AFTER
FECHHEIMER PROBES ARE
INDEPENDENTLY CALIBRATED

DATE - 6/26/1987
LOCATION - ECON WEST
FILE IDENTITY - IP6 25EWH
BAROMETRIC PRESSURE - 25.53
PROBE IDENTITY - E6
DUCT AREA - 425.0

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
1	1	0	8.9	11.0	0.00/0.00	0.0	0.0	0
1	2	0	4.4	14.6	0.00/0.00	0.0	0.0	0
1	3	4103	3.4	15.4	1.48/1.53	5.0	22.8	1177
1	4	3996	3.8	15.3	1.44/1.49	5.5	22.1	1119
1	5	4115	3.4	15.8	1.49/1.53	5.1	23.5	1159
1	6	3831	3.7	15.7	1.38/1.43	5.1	21.7	1087
1	7	797	3.8	14.8	.29/.30	0.0	0.0	226

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
2	1	0	7.3	12.4	0.00/0.00	0.0	0.0	0
2	2	0	4.3	14.4	0.00/0.00	0.0	0.0	0
2	3	4592	3.8	15.2	1.66/1.71	6.3	25.2	1308
2	4	3916	3.4	15.8	1.41/1.46	4.8	22.3	1114
2	5	3815	3.5	15.7	1.38/1.42	4.8	21.6	1081
2	6	3503	4.1	15.1	1.26/1.30	5.2	19.1	996
2	7	3700	3.8	15.0	1.34/1.38	5.1	20.0	1052

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
3	1	0	7.3	12.1	0.00/0.00	0.0	0.0	0
3	2	0	3.6	15.2	0.00/0.00	0.0	0.0	0
3	3	4276	4.2	14.8	1.54/1.59	6.5	22.8	1222
3	4	4133	4.1	14.9	1.49/1.54	6.1	22.2	1162
3	5	3499	4.2	15.0	1.26/1.30	5.3	18.9	992
3	6	3563	4.1	15.1	1.29/1.33	5.3	19.4	1006
3	7	3437	3.7	14.9	1.24/1.28	0.0	0.0	974

TAP	POINT	CORR	V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
4	1	0	6.5	13.0	0.00/0.00	0.0	0.0	..	0
4	2	0	3.9	15.3	0.00/0.00	0.0	0.0	..	0
4	3	4390	4.0	15.0	1.58/1.63	6.3	23.8	1238	
4	4	3692	4.1	15.2	1.33/1.37	5.5	20.3	1038	
4	5	2619	4.4	14.8	.95/.97	4.2	14.0	734	
4	6	3154	4.4	14.8	1.14/1.17	5.0	16.8	887	
4	7	3214	4.3	15.1	1.16/1.20	5.0	17.5	904	
TAP	POINT	CORR	V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
5	1	0	7.3	12.2	0.00/0.00	0.0	0.0	..	0
5	2	0	4.5	14.7	0.00/0.00	0.0	0.0	..	0
5	3	3503	4.0	15.2	1.26/1.30	5.1	19.2	977	
5	4	2861	4.9	14.3	1.03/1.06	5.1	14.8	801	
5	5	2812	4.5	14.7	1.02/1.05	4.6	14.9	787	
5	6	3652	4.6	14.6	1.32/1.36	6.1	19.2	1022	
5	7	3944	4.5	14.5	1.42/1.47	6.4	20.6	1100	
TAP	POINT	CORR	V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
6	1	0	4.8	14.2	0.00/0.00	0.0	0.0	..	0
6	2	0	4.8	14.5	0.00/0.00	0.0	0.0	..	0
6	3	4353	4.5	14.7	1.57/1.62	7.1	23.1	1217	
6	4	3478	4.6	14.4	1.26/1.29	5.8	18.1	981	
6	5	2947	4.4	14.7	1.06/1.10	4.7	15.6	827	
6	6	3340	4.5	14.7	1.21/1.24	5.4	17.7	857	
6	7	3500	3.9	14.9	1.26/1.30	4.9	18.8	981	
TAP	POINT	CORR	V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
7	1	0	4.8	14.4	0.00/0.00	0.0	0.0	..	0
7	2	6786	4.5	14.7	2.45/2.53	11.0	36.0	1936	
7	3	5704	4.7	14.5	2.06/2.12	9.7	29.9	1606	
7	4	2757	5.0	14.2	1.00/1.03	5.0	14.1	783	
7	5	2877	4.3	14.9	1.04/1.07	4.5	15.5	812	
7	6	3400	4.2	15.2	1.23/1.27	5.2	18.7	946	
7	7	3412	4.2	14.8	1.23/1.27	5.2	18.2	955	

IP12_004548

LOCATION = ECON WEST
FILE IDENTITY = IP6_25EWH

AVERAGE VELOCITY = 2687 FPM

AVERAGE (WEIGHTED) % O2 = 4.16 *
AVERAGE (WEIGHTED) % CO2 = 14.97 *
AVERAGE (WEIGHTED) TEMPERATURE = 756

AVERAGE (ARITHMETIC) % O2 = 4.57 *
AVERAGE (ARITHMETIC) % CO2 = 14.62 *
AVERAGE (ARITHMETIC) TEMPERATURE = 750

AVERAGE STATIC PRESSURE (in. H2O) = -2.7
AVERAGE DENSITY (LBM/FT^3) = .02832

ACFM (ACTUAL FT^3/MIN) = 1142039
LB/HR (WET) = 1940515

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED
NO. OF POINTS NOT USED = 3 OUT OF 49

IP12_004549

LOCATION = ECON WEST
FILE IDENTITY = IP6_25EWH

AVERAGE VELOCITY = 2687 FPM

AVERAGE (WEIGHTED) % O2 = 4.15
AVERAGE (WEIGHTED) % CO2 = 14.97
AVERAGE (WEIGHTED) TEMPERATURE = 756

AVERAGE (ARITHMETIC) % O2 = 4.53
AVERAGE (ARITHMETIC) % CO2 = 14.62
AVERAGE (ARITHMETIC) TEMPERATURE = 750

AVERAGE STATIC PRESSURE (in. H2O) = -2.7
AVERAGE DENSITY (LBM/FT³) = .02832

ACFM (ACTUAL FT³/MIN)
LB/HR (WET) = 1142039
= 1940515

DATE = 6-25-1987
 LOCATION = ECON EAST
 FILE IDENTITY = IP6_25EEA
 BAROMETRIC PRESSURE = 25.53
 PROBE IDENTITY = 28
 DUCT HEIGHT = 21.2
 DUCT WIDTH = 20.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
1	1	-3.2	747	.940	25	4.0	15.0
1	2	-3.1	738	.680	20	3.8	15.2
1	3	-3.2	737	.075	20	4.0	14.8
1	4	-3.1	734	.390	30	4.0	15.0
1	5	-3.0	732	.095	15	* 3.5	*15.0
1	6	-3.2	731	.227	15	3.8	15.0
1	7	-3.1	731	.311	15	3.9	15.1
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
2	1	-3.2	751	.742	30	4.1	14.8
2	2	-3.0	744	.329	15	4.0	15.0
2	3	-3.0	739	.229	15	3.8	15.1
2	4	-3.1	737	.940	20	4.0	14.8
2	5	-3.1	736	1.255	20	4.0	15.0
2	6	-3.1	734	.615	20	4.0	15.0
2	7	-3.1	736	.788	5	4.2	14.8
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
3	1	-3.1	736	1.281	0	4.2	14.6
3	2	-3.0	746	.919	10	4.0	15.2
3	3	-3.0	737	.366	0	4.0	15.1
3	4	-3.0	741	.168	15	4.0	15.0
3	5	-3.0	734	.551	15	4.1	15.0
3	6	-3.0	731	.986	0	4.2	15.1
3	7	-3.0	731	1.352	0	4.3	14.7
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
4	1	-3.1	760	1.411	0	3.9	15.4
4	2	-3.0	760	.752	0	4.0	15.2
4	3	-3.0	748	.395	0	4.5	14.8
4	4	-3.0	756	.161	0	4.3	15.0
4	5	-3.0	748	.778	0	4.4	14.6
4	6	-3.0	742	1.381	0	4.3	15.0
4	7	-2.9	746	1.969	0	4.0	15.2

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
5	1	-3.0	759	1.074	0	3.6	15.6
5	2	-3.0	772	.581	10	3.6	15.6
5	3	-3.0	762	.207	0	3.6	15.6
5	4	-2.9	767	.139	0	4.3	15.0
5	5	-2.9	763	1.057	0	4.2	15.0
5	6	-2.9	761	1.616	0	4.4	14.8
5	7	-2.9	769	1.777	1	4.0	14.9

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
6	1	-3.3	756	1.211	0	3.8	15.4
6	2	-3.3	764	.625	10	3.6	15.5
6	3	-3.1	764	.478	0	3.8	15.5
6	4	-3.1	766	.256	0	3.8	15.5
6	5	-3.1	766	.100	0	3.9	15.4
6	6	-3.1	761	.271	0	3.8	15.4
6	7	-3.0	760	.297	5	* 4.0	*14.6

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
7	1	-3.1	765	1.325	20	3.6	15.6
7	2	-3.1	759	.673	5	3.8	15.0
7	3	-3.1	764	.576	5	3.2	16.0
7	4	-3.1	769	.141	5	3.6	15.6
7	5	-3.1	770	.334	5	* 3.6	*15.8
7	6	-3.0	765	.332	10	3.9	15.2
7	7	-3.0	765	.266	10	3.9	15.0

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED

PRELIMINARY CALCULATIONS !!!!!!!
FINAL CALCULATIONS TO BE RUN AFTER
FECHHEIMER PROBES ARE
INDEPENDENTLY CALIBRATED

DATE - 6-25-1987
LOCATION - ECON EAST
FILE IDENTITY - IP6_25EEA
BAROMETRIC PRESSURE - 25.53
PROBE IDENTITY - 28
DUCT AREA - 425.0

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
1	1	6006	4.0	15.0	1.14/1.16	4.6	17.1	867
1	2	5285	3.8	15.2	1.00/1.02	3.8	15.2	755
1	3	1771	4.0	14.8	.34/.34	1.3	5.0	253
1	4	3693	4.0	15.0	.70/.71	2.8	10.5	524
1	5	2042	3.5	15.0	.39/.39	0.0	0.0	289
1	6	3146	3.8	15.0	.60/.61	2.3	9.0	445
1	7	3676	3.9	15.1	.70/.71	2.7	10.5	519

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
2	1	5115	4.1	14.8	.97/.99	4.0	14.4	742
2	2	3800	4.0	15.0	.72/.73	2.9	10.8	546
2	3	3169	3.8	15.1	.60/.61	2.3	9.1	453
2	4	6203	4.0	14.8	1.18/1.20	4.7	17.4	884
2	5	7152	4.0	15.0	1.36/1.38	5.4	20.4	1018
2	6	5021	4.0	15.0	.95/.97	3.8	14.3	713
2	7	6022	4.2	14.8	1.14/1.16	4.8	16.9	857

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
3	1	7692	4.2	14.6	1.46/1.49	6.1	21.3	1095
3	2	6448	4.0	15.2	1.22/1.25	4.9	18.6	930
3	3	4134	4.0	15.1	.78/.80	3.1	11.9	589
3	4	2719	4.0	15.0	.52/.53	2.1	7.7	389
3	5	4886	4.1	15.0	.93/.94	3.8	13.9	694
3	6	6736	4.2	15.1	1.28/1.30	5.4	19.3	952
3	7	7880	4.3	14.7	1.50/1.52	6.4	22.0	1114

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
4	1	8143	3.9	15.4	1.55/1.57	6.0	23.8	1197
4	2	5964	4.0	15.2	1.13/1.15	4.5	17.2	877
4	3	4316	4.5	14.8	.82/.83	3.7	12.1	625
4	4	2774	4.3	15.0	.53/.54	2.3	7.9	406
4	5	6040	4.4	14.6	1.15/1.17	5.0	16.7	874
4	6	7996	4.3	15.0	1.52/1.55	6.5	22.8	1147
4	7	9546	4.0	15.2	1.81/1.85	7.2	27.5	1377

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
5	1	7110	3.6	15.6	1.35/1.37	4.9	21.1	1044
5	2	5193	3.6	15.6	.99/1.00	3.5	15.4	775
5	3	3148	3.6	15.6	.60/.61	2.2	9.3	464
5	4	2590	4.3	15.0	.49/.50	2.1	7.4	384
5	5	7068	4.2	15.0	1.34/1.37	5.6	20.1	1043
5	6	8716	4.4	14.8	1.65/1.69	7.3	24.5	1283
5	7	9164	4.0	14.9	1.74/1.77	7.0	25.9	1363

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
6	1	7539	3.8	15.4	1.43/1.46	5.4	22.0	1102
6	2	5369	3.6	15.5	1.02/1.04	3.7	15.8	793
6	3	4772	3.8	15.5	.91/.92	3.4	14.0	705
6	4	3505	3.8	15.5	.67/.68	2.5	10.3	519
6	5	2199	3.9	15.4	.42/.43	1.6	6.4	326
6	6	3598	3.8	15.4	.68/.70	2.6	10.5	529
6	7	3754	4.0	14.6	.71/.73	0.0	0.0	552

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
7	1	7431	3.6	15.6	1.41/1.44	5.1	22.0	1099
7	2	5624	3.8	15.0	1.07/1.09	4.1	16.0	825
7	3	5212	3.2	16.0	.99/1.01	3.2	15.8	770
7	4	2600	3.6	15.6	.49/.50	1.8	7.7	387
7	5	3989	3.6	15.8	.76/.77	2.7	12.0	594
7	6	3927	3.9	15.2	.75/.76	2.9	11.3	581
7	7	3519	3.9	15.0	.67/.68	2.6	10.0	521

LOCATION = ECON EAST
FILE IDENTITY = IP6_25EEA

AVERAGE VELOCITY = 5171 FPM

AVERAGE (WEIGHTED) % O2 = 3.97 *
AVERAGE (WEIGHTED) % CO2 = 15.13 *
AVERAGE (WEIGHTED) TEMPERATURE = 751

AVERAGE (ARITHMETIC) % O2 = 3.95 *
AVERAGE (ARITHMETIC) % CO2 = 15.15 *
AVERAGE (ARITHMETIC) TEMPERATURE = 751

AVERAGE STATIC PRESSURE (in. H2O) = -3.1
AVERAGE DENSITY (LBM/FT^3) = .02829

ACFM (ACTUAL FT^3/MIN) = 2197863
LB/HR (WET) = 3730533

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED
NO. OF POINTS NOT USED = 2 OUT OF 49

IP12_004555

LOCATION = ECON EAST
FILE IDENTITY = IP6_25EEA

AVERAGE VELOCITY = 5171 FPM

AVERAGE (WEIGHTED) % O2 = 3.97
AVERAGE (WEIGHTED) % CO2 = 15.12
AVERAGE (WEIGHTED) TEMPERATURE = 751

AVERAGE (ARITHMETIC) % O2 = 3.94
AVERAGE (ARITHMETIC) % CO2 = 15.13
AVERAGE (ARITHMETIC) TEMPERATURE = 751

AVERAGE STATIC PRESSURE (in. H2O) = -3.1
AVERAGE DENSITY (LBM/FT³) = .02829

ACFM (ACTUAL FT³/MIN) = 2197863
LB/HR (WET) = 3730533

IP12_004556

DATE = 6/25/87
 LOCATION = ECON EAST
 FILE IDENTITY = IP6_25EEH
 BAROMETRIC PRESSURE = 25.53
 PROBE IDENTITY = E8
 DUCT HEIGHT = 21.2
 DUCT WIDTH = 20.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
1	1	-3.1	744	.046	40	4.6	14.6
1	2	-3.4	767	.068	20	3.2	16.0
1	3	-2.7	769	.698	50	2.8	16.4
1	4	-2.8	774	.493	50	3.4	15.8
1	5	-2.9	763	.429	55	3.2	15.8
1	6	-2.9	768	.459	40	3.6	15.4
1	7	-3.0	762	.236	60	4.6	14.4

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
2	1	-3.3	761	.041	0	3.0	16.0
2	2	-3.2	764	.109	30	3.8	15.4
2	3	-2.8	766	.683	40	3.4	15.6
2	4	-2.8	768	.490	60	3.6	15.6
2	5	-2.9	754	.358	60	3.6	15.6
2	6	-2.8	752	.361	50	4.0	15.2
2	7	-2.9	751	.153	20	4.4	14.6

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
3	1	-3.0	760	.007	70	2.4	16.6
3	2	-3.2	761	.075	60	2.8	16.2
3	3	-2.6	771	.686	60	2.0	16.8
3	4	-2.6	765	.578	60	3.2	15.6
3	5	-2.7	746	.400	60	3.8	15.6
3	6	-2.9	736	.131	55	3.6	15.6
3	7	-3.0	738	.095	40	3.8	15.2

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
4	1	-3.0	754	.004	60	2.6	16.4
4	2	-3.0	756	.031	45	3.2	15.8
4	3	-2.6	764	.712	60	2.0	17.0
4	4	-2.5	763	.615	40	2.6	16.4
4	5	-2.8	747	.439	40	3.2	16.0
4	6	-2.7	733	.368	40	3.4	15.6
4	7	-2.8	734	.249	40	3.0	16.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
5	1	-3.1	665	.007	60	4.4	14.8
5	2	-3.0	748	.009	60	2.4	16.6
5	3	-2.7	763	.622	60	2.2	16.6
5	4	-2.8	755	.576	40	2.8	16.2
5	5	-2.8	756	.502	40	3.2	15.8
5	6	-2.7	742	.383	30	3.2	16.0
5	7	-3.3	746	.217	40	3.6	15.4

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
6	1	-3.4	450	1.372	25	4.0	15.0
6	2	-3.4	745	.874	30	2.6	16.4
6	3	-3.2	747	.778	50	2.2	16.8
6	4	-3.4	743	.275	45	2.4	16.6
6	5	-3.3	753	.349	55	2.6	16.4
6	6	-3.4	747	.383	45	3.6	15.8
6	7	-3.3	746	.485	0	2.8	16.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
7	1	-3.1	702	.024	45	3.2	16.0
7	2	-3.1	740	.026	0	2.6	16.4
7	3	-3.0	736	.061	30	2.4	16.8
7	4	-2.6	724	.647	55	2.4	16.4
7	5	-2.7	736	.527	45	2.8	16.4
7	6	-2.7	742	.473	55	3.2	16.0
7	7	-2.8	748	.322	55	2.8	16.0

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED

PRELIMINARY CALCULATIONS !!!!!!!
FINAL CALCULATIONS TO BE RUN AFTER
FECHHEIMER PROBES ARE
INDEPENDENTLY CALIBRATED

DATE = 6/25/87
LOCATION = ECON EAST
FILE IDENTITY = IP6 25EEH
BAROMETRIC PRESSURE = 25.53
PROBE IDENTITY = E8
DUCT AREA = 425.0

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
1	1	1135	4.6	14.6	.45	2.1	6.5	333
1	2	1706	3.2	16.0	.67	2.1	10.7	515
1	3	3703	2.8	16.4	1.46	4.1	23.9	1121
1	4	3126	3.4	15.8	1.23	4.2	19.4	952
1	5	2592	3.2	15.8	1.02	3.3	16.1	778
1	6	3589	3.6	15.4	1.41	5.1	21.8	1085
1	7	1683	4.6	14.4	.66	3.0	9.5	505
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
2	1	1408	3.0	16.0	.55	1.7	8.9	421
2	2	1986	3.8	15.4	.78	3.0	12.0	597
2	3	4364	3.4	15.6	1.72	5.8	26.8	1316
2	4	2419	3.6	15.6	.95	3.4	14.8	731
2	5	2058	3.6	15.6	.81	2.9	12.6	611
2	6	2656	4.0	15.2	1.05	4.2	15.9	786
2	7	2537	4.4	14.6	1.00	4.4	14.6	750
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
3	1	199	2.4	16.6	.08	.2	1.3	60
3	2	950	2.8	16.2	.37	1.0	6.1	285
3	3	2857	2.0	16.8	1.12	2.2	18.9	867
3	4	2622	3.2	15.6	1.03	3.3	16.1	790
3	5	2166	3.8	15.6	.85	3.2	13.3	636
3	6	1423	3.6	15.6	.56	2.0	8.7	412
3	7	1623	3.8	15.2	.64	2.4	9.7	472

TAP	POINT	CORR	V	%O2	% CO2	V	LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
4	1	220	2.6		16.4	.09		.2	1.4	65
4	2	864	3.2		15.8	.34		1.1	5.4	257
4	3	2901	2.0		17.0	1.14		2.3	19.4	873
4	4	4134	2.6		16.4	1.63		4.2	26.7	1242
4	5	3477	3.2		16.0	1.37		4.4	21.9	1023
4	6	3169	3.4		15.6	1.25		4.2	19.5	914
4	7	2611	3.0		16.0	1.03		3.1	16.4	754

TAP	POINT	CORR	V	%O2	% CO2	V	LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
5	1	280	4.4		14.8	.11		.5	1.6	73
5	2	329	2.4		16.6	.13		.3	2.1	97
5	3	2713	2.2		16.6	1.07		2.3	17.7	814
5	4	3991	2.8		16.2	1.57		4.4	25.4	1186
5	5	3731	3.2		15.8	1.47		4.7	23.2	1110
5	6	3665	3.2		16.0	1.44		4.6	23.1	1070
5	7	2454	3.6		15.4	.97		3.5	14.9	720

TAP	POINT	CORR	V	%O2	% CO2	V	LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
6	1	6268	4.0		15.0	2.47		9.9	37.0	1110
6	2	5525	2.6		16.4	2.17		5.7	35.7	1619
6	3	3872	2.2		16.8	1.52		3.4	25.6	1138
6	4	2542	2.4		16.6	1.00		2.4	16.6	744
6	5	2330	2.6		16.4	.92		2.4	15.0	690
6	6	3003	3.6		15.8	1.18		4.3	18.7	883
6	7	4771	2.8		16.0	1.88		5.3	30.0	1400

TAP	POINT	CORR	V	%O2	% CO2	V	LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
7	1	743	3.2		16.0	.29		.9	4.7	205
7	2	1112	2.6		16.4	.44		1.1	7.2	324
7	3	1468	2.4		16.8	.58		1.4	9.7	425
7	4	3122	2.4		16.4	1.23		2.9	20.1	889
7	5	3494	2.8		16.4	1.38		3.9	22.6	1011
7	6	2695	3.2		16.0	1.06		3.4	17.0	786
7	7	2234	2.8		16.0	.88		2.5	14.1	658

LOCATION = ECON EAST
FILE IDENTITY = IP6_25EEH

AVERAGE VELOCITY = 2541 FPM

AVERAGE (WEIGHTED) % O2 = 3.12 *
AVERAGE (WEIGHTED) % CO2 = 15.93 *
AVERAGE (WEIGHTED) TEMPERATURE = 737

AVERAGE (ARITHMETIC) % O2 = 3.15 *
AVERAGE (ARITHMETIC) % CO2 = 15.91 *
AVERAGE (ARITHMETIC) TEMPERATURE = 743

AVERAGE STATIC PRESSURE (in. H2O) = -3.0
AVERAGE DENSITY (LBM/FT^3) = .02856

ACFM (ACTUAL FT^3/MIN) = 1080036
LB/HR (WET) = 1850710

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED
NO. OF POINTS NOT USED = 0 OUT OF 49

IP12_004561

LOCATION = ECON EAST
FILE IDENTITY = IP6_25EEH

AVERAGE VELOCITY = 2541 FPM

AVERAGE (WEIGHTED) % O2 = 3.12
AVERAGE (WEIGHTED) % CO2 = 15.93
AVERAGE (WEIGHTED) TEMPERATURE = 737

AVERAGE (ARITHMETIC) % O2 = 3.15
AVERAGE (ARITHMETIC) % CO2 = 15.91
AVERAGE (ARITHMETIC) TEMPERATURE = 743

AVERAGE STATIC PRESSURE (in. H2O) = -3.0
AVERAGE DENSITY (LBM/FT^3) = .02856

ACFM (ACTUAL FT^3/MIN) = 1080036
LB/HR (WET) = 1850710

DATE = 6/25/87
 LOCATION = WESTSECGASIN
 FILE IDENTITY = IP6_25WSGI
 BAROMETRIC PRESSURE = 25.52
 PROBE IDENTITY = E-27
 DUCT HEIGHT = 19.7
 DUCT WIDTH = 40.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
1	1	-3.4	746	.236	10	4.2	15.0
1	2	-3.5	749	.214	15	4.2	15.0
1	3	-3.6	749	.136	3	4.2	15.0
1	4	-3.7	749	.173	0	4.2	15.0
1	5	-3.7	749	.173	10	4.2	15.0
1	6	-3.7	749	.151	10	4.2	15.0
1	7	-3.7	744	.043	0	4.2	15.0
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
2	1	-3.5	750	.236	13	4.2	15.0
2	2	-3.6	753	.173	25	4.2	15.0
2	3	-3.8	752	.168	15	4.2	15.0
2	4	-3.8	752	.114	0	4.2	15.0
2	5	-3.7	755	.299	15	4.2	15.0
2	6	-3.7	751	.170	22	4.2	15.0
2	7	-3.6	745	.048	0	4.2	15.0
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
3	1	-3.5	752	.273	10	4.2	15.0
3	2	-3.5	753	.168	10	4.2	15.0
3	3	-3.6	753	.217	10	4.2	15.0
3	4	-3.5	751	.183	5	4.2	15.0
3	5	-3.6	749	.161	10	4.2	15.0
3	6	-3.6	747	.053	10	4.2	15.0
3	7	-3.5	738	.007	0	4.2	15.0
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
4	1	-3.4	753	.266	5	4.2	15.0
4	2	-3.5	755	.249	0	4.2	15.0
4	3	-3.5	760	.229	7	4.2	15.0
4	4	-3.7	753	.236	3	4.2	15.0
4	5	-3.7	751	.092	6	4.2	15.0
4	6	-3.8	747	.026	12	4.2	15.0
4	7	-3.8	743	.007	0	4.2	15.0

3/14/81 44 ft West, Clean Loc.

DATE = 6-26-87
LOCATION = ECON WEST
FILE IDENTITY = IP6_26EWA
BAROMETRIC PRESSURE = 25.49
PROBE IDENTITY = E-43
DUCT HEIGHT = 21.2
DUCT WIDTH = 20.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
1	1	-3.8	733	.046	5	3.7	15.5
1	2	-3.5	743	.046	0	4.6	14.8
1	3	-3.7	737	.046	5	3.7	15.6
1	4	-3.5	729	.417	30	4.4	15.0
1	5	-3.5	733	.366	35	4.0	15.2
1	6	-3.5	736	.297	25	4.1	15.4
1	7	-3.4	732	.214	35	3.6	15.3

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
2	1	-3.7	689	.051	0	* 7.5	*12.5
2	2	-3.5	749	.048	5	* 3.8	*16.0
2	3	-3.5	748	.041	10	* 3.0	*15.3
2	4	-3.4	745	.336	25	3.8	15.6
2	5	-3.4	746	.114	30	3.7	15.5
2	6	-3.3	746	.268	30	3.0	16.3
2	7	-3.3	747	.354	25	3.6	15.4

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
3	1	-3.5	728	.046	0	4.9	14.7
3	2	-3.6	761	.053	5	4.0	15.0
3	3	-3.7	766	.292	15	4.0	15.4
3	4	-3.5	756	.422	25	3.9	15.4
3	5	-3.5	758	.322	30	3.1	16.1
3	6	-3.5	753	.214	20	4.1	15.4
3	7	-3.5	749	.344	10	* 3.7	*15.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
4	1	-3.8	755	.056	5	4.1	15.2
4	2	-3.8	768	.097	0	3.6	15.4
4	3	-3.7	772	.410	10	4.2	15.2
4	4	-3.6	766	.449	25	3.6	15.8
4	5	-3.5	752	.351	35	3.5	15.5
4	6	-3.6	751	.268	20	3.3	15.6
4	7	-3.6	749	.349	0	* 3.6	*15.2

IP12_004564

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
5	1	-3.6	742	.056	0	3.8	15.2
5	2	-3.5	769	.095	5	3.9	15.4
5	3	-3.6	771	.432	5	4.0	15.4
5	4	-3.6	763	.400	20	3.6	15.6
5	5	-3.5	750	.288	20	3.9	15.4
5	6	-3.6	752	.356	20	3.5	15.4
5	7	-3.4	751	.422	0	* 3.8	*15.0
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
6	1	-3.8	762	.058	5	4.2	15.2
6	2	-3.8	767	.092	0	3.8	15.6
6	3	-3.7	767	.200	0	3.7	15.6
6	4	-3.5	759	.372	5	4.0	15.0
6	5	-3.6	752	.209	10	4.0	15.2
6	6	-3.5	755	.244	35	4.2	15.4
6	7	-3.5	750	.268	0	3.6	15.4
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
7	1	-3.6	712	.067	0	* 4.8	*15.0
7	2	-3.5	767	.102	5	4.0	15.2
7	3	-3.5	766	.148	10	4.4	15.1
7	4	-3.5	759	.434	10	3.8	15.4
7	5	-3.5	754	.307	5	4.2	15.2
7	6	-3.7	763	.253	30	4.5	15.1
7	7	-3.6	765	.134	40	4.3	14.7

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED

IP12_004565

PRELIMINARY CALCULATIONS !!!!!!!
FINAL CALCULATIONS TO BE RUN AFTER
FECHHEIMER PROBES ARE
INDEPENDENTLY CALIBRATED

DATE = 6-26-87
LOCATION = ECON WEST
FILE IDENTITY = IP6_26EWA
BAROMETRIC PRESSURE = 25.49
PROBE IDENTITY = E-43
DUCT AREA = 425.0

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
1	1	1470	3.7	15.5	.50/.50	1.8	7.7	368
1	2	1482	4.6	14.8	.50/.51	2.3	7.4	377
1	3	1472	3.7	15.6	.50/.50	1.8	7.7	371
1	4	3812	4.4	15.0	1.28/1.30	5.7	19.3	951
1	5	3385	4.0	15.2	1.14/1.16	4.6	17.3	848
1	6	3380	4.1	15.4	1.14/1.16	4.7	17.5	851
1	7	2593	3.6	15.3	.87/.89	3.1	13.4	649

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
2	1	1528	7.5	12.5	.51/.52	0.0	0.0	360
2	2	1510	3.8	16.0	.51/.52	0.0	0.0	386
2	3	1381	3.0	15.3	.47/.47	0.0	0.0	353
2	4	3606	3.8	15.6	1.22/1.23	4.6	19.0	919
2	5	2017	3.7	15.5	.68/.69	2.5	10.5	515
2	6	3079	3.0	16.3	1.04/1.05	3.1	16.9	785
2	7	3704	3.6	15.4	1.25/1.27	4.5	19.2	945

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
3	1	1473	4.9	14.7	.50/.50	2.4	7.3	367
3	2	1597	4.0	15.0	.54/.55	2.2	8.1	415
3	3	3619	4.0	15.4	1.22/1.24	4.9	18.8	947
3	4	4057	3.9	15.4	1.37/1.39	5.3	21.1	1048
3	5	3392	3.1	16.1	1.14/1.16	3.5	18.4	880
3	6	3000	4.1	15.4	1.01/1.03	4.1	15.6	772
3	7	3976	3.7	15.0	1.34/1.36	0.0	0.0	1019

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
4	1	1637	4.1	15.2	.55/.56	2.3	8.4	423
4	2	2171	3.6	15.4	.73/.74	2.6	11.3	570
4	3	4378	4.2	15.2	1.48/1.50	6.2	22.4	1155
4	4	4200	3.6	15.8	1.42/1.44	5.1	22.4	1100
4	5	3342	3.5	15.5	1.13/1.14	3.9	17.5	859
4	6	3352	3.3	15.6	1.13/1.15	3.7	17.6	860
4	7	4066	3.6	15.2	1.37/1.39	0.0	0.0	1041

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
5	1	1634	3.8	15.2	.55/.56	2.1	8.4	414
5	2	2140	3.9	15.4	.72/.73	2.8	11.1	562
5	3	4541	4.0	15.4	1.53/1.55	6.1	23.6	1197
5	4	4109	3.6	15.6	1.38/1.40	5.0	21.6	1072
5	5	3472	3.9	15.4	1.17/1.19	4.6	18.0	890
5	6	3862	3.5	15.4	1.30/1.32	4.6	20.0	993
5	7	4470	3.8	15.0	1.51/1.53	0.0	0.0	1148

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
6	1	1670	4.2	15.2	.56/.57	2.4	8.6	435
6	2	2112	3.8	15.6	.71/.72	2.7	11.1	554
6	3	3106	3.7	15.6	1.05/1.06	3.9	16.3	815
6	4	4197	4.0	15.0	1.41/1.43	5.7	21.2	1089
6	5	3108	4.0	15.2	1.05/1.06	4.2	15.9	799
6	6	2793	4.2	15.4	.94/.96	4.0	14.5	721
6	7	3567	3.6	15.4	1.20/1.22	4.3	18.5	915

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
7	1	1763	4.8	15.0	.59/.60	0.0	0.0	429
7	2	2215	4.0	15.2	.75/.76	3.0	11.3	581
7	3	2634	4.4	15.1	.89/.90	3.9	13.4	690
7	4	4476	3.8	15.4	1.51/1.53	5.7	23.2	1161
7	5	3807	4.2	15.2	1.28/1.30	5.4	19.5	981
7	6	3018	4.5	15.1	1.02/1.03	4.6	15.4	787
7	7	1951	4.3	14.7	.66/.67	2.8	9.7	510

LOCATION = ECON WEST
FILE IDENTITY = IP6_26EWA

AVERAGE VELOCITY = 2925 FPM

AVERAGE (WEIGHTED) % O2 = 3.87 *
AVERAGE (WEIGHTED) % CO2 = 15.38 *
AVERAGE (WEIGHTED) TEMPERATURE = 753

AVERAGE (ARITHMETIC) % O2 = 3.90 *
AVERAGE (ARITHMETIC) % CO2 = 15.35 *
AVERAGE (ARITHMETIC) TEMPERATURE = 751

AVERAGE STATIC PRESSURE (in. H2O) = -3.6
AVERAGE DENSITY (LBM/FT^3) = .02823

ACFM (ACTUAL FT^3/MIN) = 1243149
LB/HR (WET) = 2105932

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED
NO. OF POINTS NOT USED = 7 OUT OF 49

IP12_004568

LOCATION = ECON WEST
FILE IDENTITY = IP6_26EWA

AVERAGE VELOCITY = 2925 FPM

AVERAGE (WEIGHTED) % O2 = 3.90
AVERAGE (WEIGHTED) % CO2 = 15.32
AVERAGE (WEIGHTED) TEMPERATURE = 753

AVERAGE (ARITHMETIC) % O2 = 3.96
AVERAGE (ARITHMETIC) % CO2 = 15.28
AVERAGE (ARITHMETIC) TEMPERATURE = 751

AVERAGE STATIC PRESSURE (in. H2O) = -3.6
AVERAGE DENSITY (LBM/FT³) = .02823

ACFM (ACTUAL FT³/MIN) = 1243149
LB/HR (WET) = 2105932

DATE = 6-26-87
 LOCATION = ECON WEST
 FILE IDENTITY = IP6_26EWH
 BAROMETRIC PRESSURE = 25.49
 PROBE IDENTITY = E-6
 DUCT HEIGHT = 21.2
 DUCT WIDTH = 20.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
1	1	-3.1	722	0.000	0	* 5.1	*13.7
1	2	-2.8	767	.673	60	5.1	14.1
1	3	-2.8	761	.050	20	4.9	14.1
1	4	-2.7	760	.476	65	5.0	14.2
1	5	-2.8	755	.417	56	4.6	14.4
1	6	-2.7	748	.402	54	4.8	14.4
1	7	-2.9	722	.371	45	4.8	14.4

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
2	1	-2.7	763	0.000	0	5.2	14.0
2	2	-2.8	765	0.000	0	5.2	14.0
2	3	-2.8	751	.998	10	5.2	14.0
2	4	-2.7	765	.024	25	5.2	14.0
2	5	-2.7	760	.014	15	5.0	14.2
2	6	-2.7	756	.112	30	4.9	14.3
2	7	-2.8	752	.183	35	4.4	14.8

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
3	1	-2.8	737	0.000	0	6.1	13.5
3	2	-3.0	765	0.000	0	5.2	13.8
3	3	-3.1	763	.590	40	4.8	14.4
3	4	-2.9	765	.532	60	5.2	14.0
3	5	-3.0	763	.432	50	4.6	14.5
3	6	-3.0	761	.416	45	4.4	14.6
3	7	-2.9	756	.190	10	4.6	14.4

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
4	1	-2.8	710	0.000	0	7.1	12.4
4	2	-2.9	767	0.000	0	4.9	14.4
4	3	-2.9	760	.854	0	4.4	14.8
4	4	-2.8	760	.419	5	4.7	14.6
4	5	-3.0	767	.417	40	5.0	14.4
4	6	-2.9	763	.407	50	4.7	14.5
4	7	-2.8	766	.286	40	4.4	14.8

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
5	1	-2.7	738	0.000	0	7.4	12.2
5	2	-2.7	764	0.000	0	4.4	14.8
5	3	-2.9	773	.034	0	5.2	14.2
5	4	-3.0	766	.422	0	4.5	14.7
5	5	-2.9	768	.424	40	4.4	14.8
5	6	-2.9	766	.401	45	3.9	15.5
5	7	-2.8	768	.034	10	4.2	15.1

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
6	1	-2.8	676	0.000	0	7.1	12.5
6	2	-2.9	771	0.000	0	4.4	14.8
6	3	-3.1	773	.576	45	4.7	14.5
6	4	-3.1	770	.505	35	4.0	15.0
6	5	-3.0	766	.397	40	4.2	14.8
6	6	-3.1	762	.351	50	4.4	14.8
6	7	-3.0	760	.401	75	5.2	13.9

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
7	1	-2.8	709	0.000	0	7.4	12.0
7	2	-2.9	771	0.000	0	4.6	14.4
7	3	-3.0	778	.710	0	4.7	14.5
7	4	-2.9	769	.241	0	4.0	15.2
7	5	-3.0	753	.439	25	3.6	15.4
7	6	-3.0	758	.307	20	4.4	14.8
7	7	-2.9	763	.124	35	4.2	14.8

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED

 PRELIMINARY CALCULATIONS !!!!!!!
 FINAL CALCULATIONS TO BE RUN AFTER
 FECHHEIMER PROBES ARE
 INDEPENDENTLY CALIBRATED

DATE = 6-26-87
 LOCATION = ECON WEST
 FILE IDENTITY = IP6_26EWH
 BAROMETRIC PRESSURE = 25.49
 PROBE IDENTITY = E-6
 DUCT AREA = 425.0

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
1	1	0	5.1	13.7	0.00/0.00	0.0	0.0	0
1	2	2835	5.1	14.1	1.23/1.26	6.3	17.4	967
1	3	1463	4.9	14.1	.64/.65	3.1	9.0	495
1	4	2012	5.0	14.2	.88/.89	4.4	12.4	680
1	5	2488	4.6	14.4	1.08/1.11	5.0	15.6	835
1	6	2560	4.8	14.4	1.11/1.14	5.4	16.1	851
1	7	2928	4.8	14.4	1.28/1.30	6.1	18.4	940

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
2	1	0	5.2	14.0	0.00/0.00	0.0	0.0	0
2	2	0	5.2	14.0	0.00/0.00	0.0	0.0	0
2	3	6740	5.2	14.0	2.94/3.00	15.3	41.1	2250
2	4	980	5.2	14.0	.43/.44	2.2	6.0	333
2	5	797	5.0	14.2	.35/.35	1.7	4.9	269
2	6	2008	4.9	14.3	.87/.89	4.3	12.5	675
2	7	2419	4.4	14.8	1.05/1.08	4.6	15.6	809

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
3	1	0	6.1	13.5	0.00/0.00	0.0	0.0	0
3	2	0	5.2	13.8	0.00/0.00	0.0	0.0	0
3	3	4062	4.8	14.4	1.77/1.81	8.5	25.5	1378
3	4	2522	5.2	14.0	1.10/1.12	5.7	15.4	858
3	5	2920	4.6	14.5	1.27/1.30	5.9	18.4	990
3	6	3151	4.4	14.6	1.37/1.40	6.0	20.0	1067
3	7	2969	4.6	14.4	1.29/1.32	5.9	18.6	998

TAP	POINT	CORR	V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
4	1	0	7.1	12.4	14.4	0.00/0.00	0.0	0.0	0
4	2	0	4.9	14.4	14.4	0.00/0.00	0.0	0.0	0
4	3	6357	4.4	14.8	14.8	2.77/2.83	12.2	41.0	2148
4	4	4451	4.7	14.6	14.6	1.94/1.98	9.1	28.3	1504
4	5	3426	5.0	14.4	14.4	1.49/1.52	7.5	21.5	1168
4	6	2835	4.7	14.5	14.5	1.23/1.26	5.8	17.9	962
4	7	2839	4.4	14.8	14.8	1.24/1.26	5.4	18.3	967
TAP	POINT	CORR	V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
5	1	0	7.4	12.2	14.8	0.00/0.00	0.0	0.0	0
5	2	0	4.4	14.8	14.8	0.00/0.00	0.0	0.0	0
5	3	1291	5.2	14.2	14.2	.56/.57	2.9	8.0	444
5	4	4497	4.5	14.7	14.7	1.96/2.00	8.8	28.8	1532
5	5	3455	4.4	14.8	14.8	1.50/1.54	6.6	22.3	1180
5	6	3097	3.9	15.5	15.5	1.35/1.38	5.3	20.9	1055
5	7	1267	4.2	15.1	15.1	.55/.56	2.3	8.3	432
TAP	POINT	CORR	V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
6	1	0	7.1	12.5	14.8	0.00/0.00	0.0	0.0	0
6	2	0	4.4	14.8	14.8	0.00/0.00	0.0	0.0	0
6	3	3721	4.7	14.5	14.5	1.62/1.65	7.6	23.5	1278
6	4	4033	4.0	15.0	15.0	1.76/1.79	7.0	26.3	1381
6	5	3342	4.2	14.8	14.8	1.46/1.49	6.1	21.5	1138
6	6	2634	4.4	14.8	14.8	1.15/1.17	5.0	17.0	892
6	7	1133	5.2	13.9	13.9	.49/.50	2.6	6.9	383
TAP	POINT	CORR	V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
7	1	0	7.4	12.0	14.4	0.00/0.00	0.0	0.0	0
7	2	0	4.6	14.4	14.4	0.00/0.00	0.0	0.0	0
7	3	5849	4.7	14.5	14.5	2.55/2.60	12.0	36.9	2024
7	4	3408	4.0	15.2	15.2	1.48/1.51	5.9	22.6	1165
7	5	4130	3.6	15.4	15.4	1.80/1.84	6.5	27.7	1382
7	6	3596	4.4	14.8	14.8	1.57/1.60	6.9	23.2	1212
7	7	2003	4.2	14.8	14.8	.87/.89	3.7	12.9	680

IP12_004573

LOCATION = ECON WEST
FILE IDENTITY = IP6_26EWH

AVERAGE VELOCITY = 2249 FPM

AVERAGE (WEIGHTED) % O2 = 4.58 *
AVERAGE (WEIGHTED) % CO2 = 14.60 *
AVERAGE (WEIGHTED) TEMPERATURE = 762

AVERAGE (ARITHMETIC) % O2 = 4.90 *
AVERAGE (ARITHMETIC) % CO2 = 14.31 *
AVERAGE (ARITHMETIC) TEMPERATURE = 757

AVERAGE STATIC PRESSURE (in. H2O) = -2.9
AVERAGE DENSITY (LBM/FT^3) = .02811

ACFM (ACTUAL FT^3/MIN) = 955959
LB/HR (WET) = 1612075

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED
NO. OF POINTS NOT USED = 1 OUT OF 49

IP12_004574

LOCATION = ECON WEST
FILE IDENTITY = IP6_26EWH

AVERAGE VELOCITY = 2249 FPM

AVERAGE (WEIGHTED) % O2 = 4.58
AVERAGE (WEIGHTED) % CO2 = 14.60
AVERAGE (WEIGHTED) TEMPERATURE = 762

AVERAGE (ARITHMETIC) % O2 = 4.91
AVERAGE (ARITHMETIC) % CO2 = 14.29
AVERAGE (ARITHMETIC) TEMPERATURE = 757

AVERAGE STATIC PRESSURE (in. H2O) = -2.9
AVERAGE DENSITY (LBM/FT³) = .02811

ACFM (ACTUAL FT³/MIN)
LB/HR (WET) = 955959
= 1612075

DATE = 6-26-87
 LOCATION = ECON EAST
 FILE IDENTITY = IP6_26EEA
 BAROMETRIC PRESSURE = 25.49
 PROBE IDENTITY = 28
 DUCT HEIGHT = 21.2
 DUCT WIDTH = 20.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%02	% CO2
1	1	-3.2	753	.874	30	4.7	14.3
1	2	-3.3	743	.380	20	4.6	14.4
1	3	-3.1	744	.300	20	4.5	14.5
1	4	-3.2	743	.349	25	4.8	14.2
1	5	-3.2	736	.400	30	4.5	14.7
1	6	-3.1	724	.334	20	4.6	14.6
1	7	-3.2	718	.588	10	* 4.4	*14.4

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%02	% CO2
2	1	-3.1	748	.737	30	4.7	14.5
2	2	-3.1	744	.454	25	4.7	14.5
2	3	-3.0	739	.200	15	4.0	15.0
2	4	-3.0	742	.202	35	4.8	14.2
2	5	-2.9	734	.539	25	4.4	14.6
2	6	-2.9	733	1.269	30	4.5	14.8
2	7	-3.0	734	1.816	70	4.7	14.2

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%02	% CO2
3	1	-3.4	751	.810	5	* 4.6	*14.2
3	2	-3.6	760	.734	10	4.8	14.2
3	3	-3.3	749	.461	10	4.3	14.7
3	4	-3.2	753	.317	15	* 4.1	*14.6
3	5	-3.2	743	.104	15	4.3	15.0
3	6	-3.5	738	.314	5	4.2	15.2
3	7	-3.3	737	.229	5	* 4.4	*14.3

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%02	% CO2
4	1	-3.5	756	1.269	0	5.0	14.2
4	2	-3.3	771	.664	0	4.4	14.9
4	3	-3.4	763	.385	0	4.4	14.9
4	4	-3.2	764	.136	5	4.3	15.0
4	5	-3.3	756	.109	10	4.6	14.6
4	6	-3.4	752	.307	5	4.5	14.5
4	7	-3.2	755	.344	5	* 4.1	*14.5

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
5	1	-3.1	778	.986	0	4.0	15.2
5	2	-3.2	778	.827	0	4.4	15.0
5	3	-3.2	771	.617	0	4.2	15.2
5	4	-3.2	776	.129	5	4.2	15.0
5	5	-3.1	772	.144	5	4.2	15.0
5	6	-3.1	766	.253	0	4.2	15.0
5	7	-3.2	751	.341	5	4.7	14.2
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
6	1	-3.5	716	1.079	0	4.4	14.8
6	2	-3.6	779	.839	0	4.2	15.2
6	3	-3.5	787	.202	0	3.9	15.4
6	4	-3.3	785	.316	0	* 4.5	*15.5
6	5	-3.2	782	.380	0	3.4	15.4
6	6	-3.3	777	.339	0	3.4	15.4
6	7	-3.2	778	.317	0	4.0	14.8
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
7	1	-3.4	77	.985	5	4.2	14.8
7	2	-3.4	772	.314	5	4.1	15.2
7	3	-3.4	780	.151	5	3.8	15.6
7	4	-3.3	777	.134	5	* 3.5	*16.0
7	5	-3.3	784	.185	5	* 3.2	*16.2
7	6	-3.4	756	.362	10	3.8	15.4
7	7	-3.3	781	.290	10	3.8	15.4

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED

 PRELIMINARY CALCULATIONS !!!!!!!
 FINAL CALCULATIONS TO BE RUN AFTER
 FECHHEIMER PROBES ARE
 INDEPENDENTLY CALIBRATED

DATE - 6-26-87
 LOCATION - ECON EAST
 FILE IDENTITY - IP6_26EEA
 BAROMETRIC PRESSURE - 25.49
 PROBE IDENTITY - 28
 DUCT AREA - 425.0

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
1	1	5558	4.7	14.3	1.30/1.32	6.1	18.6	993
1	2	3976	4.6	14.4	.93/.94	4.3	13.4	701
1	3	3537	4.5	14.5	.83/.84	3.7	12.0	624
1	4	3677	4.8	14.2	.86/.87	4.1	12.2	648
1	5	3745	4.5	14.7	.88/.89	4.0	12.9	654
1	6	3697	4.6	14.6	.87/.88	4.0	12.7	635
1	7	5116	4.4	14.4	1.20/1.21	0.0	0.0	871

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
2	1	5096	4.7	14.5	1.20/1.21	5.6	17.3	905
2	2	4187	4.7	14.5	.98/.99	4.6	14.2	739
2	3	2965	4.0	15.0	.70/.70	2.8	10.4	520
2	4	2532	4.8	14.2	.59/.60	2.9	8.4	445
2	5	4539	4.4	14.6	1.06/1.08	4.7	15.5	790
2	6	6619	4.5	14.8	1.55/1.57	7.0	23.0	1150
2	7	3126	4.7	14.2	.73/.74	3.4	10.4	544

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
3	1	6154	4.6	14.2	1.44/1.46	0.0	0.0	1096
3	2	5818	4.8	14.2	1.36/1.38	6.6	19.4	1049
3	3	4595	4.3	14.7	1.08/1.09	4.6	15.8	816
3	4	3750	4.1	14.6	.88/.89	0.0	0.0	670
3	5	2147	4.3	15.0	.50/.51	2.2	7.6	378
3	6	3824	4.2	15.2	.90/.91	3.8	13.6	669
3	7	3271	4.4	14.3	.77/.78	0.0	0.0	572

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
4	1	7732	5.0	14.2	1.81/1.83	9.1	25.8	1387
4	2	5639	4.4	14.9	1.32/1.34	5.8	19.7	1031
4	3	4292	4.4	14.9	1.01/1.02	4.4	15.0	777
4	4	2552	4.3	15.0	.60/.61	2.6	9.0	462
4	5	2254	4.6	14.6	.53/.53	2.4	7.7	404
4	6	3807	4.5	14.5	.89/.90	4.0	12.9	680
4	7	4032	4.1	14.5	.95/.96	0.0	0.0	722
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
5	1	6877	4.0	15.2	1.61/1.63	6.5	24.5	1270
5	2	6305	4.4	15.0	1.48/1.50	6.5	22.2	1164
5	3	5435	4.2	15.2	1.27/1.29	5.4	19.4	994
5	4	2499	4.2	15.0	.59/.59	2.5	8.8	460
5	5	2634	4.2	15.0	.62/.62	2.6	9.3	483
5	6	3489	4.2	15.0	.82/.83	3.4	12.3	634
5	7	4009	4.7	14.2	.94/.95	4.4	13.4	714
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
6	1	7010	4.4	14.8	1.64/1.66	7.2	24.3	1191
6	2	6353	4.2	15.2	1.49/1.51	6.3	22.7	1173
6	3	3148	3.9	15.4	.74/.75	2.9	11.4	588
6	4	3923	4.5	15.5	.92/.93	0.0	0.0	731
6	5	4296	3.4	15.4	1.01/1.02	3.4	15.5	797
6	6	4052	3.4	15.4	.95/.96	3.2	14.6	747
6	7	3923	4.0	14.8	.92/.93	3.7	13.6	724
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
7	1	4475	4.2	14.8	1.05/1.06	4.4	15.5	82
7	2	3878	4.1	15.2	.91/.92	3.7	13.8	710
7	3	2704	3.8	15.6	.63/.64	2.4	9.9	500
7	4	2545	3.5	16.0	.60/.60	0.0	0.0	469
7	5	2995	3.2	16.2	.70/.71	0.0	0.0	557
7	6	4086	3.8	15.4	.96/.97	3.6	14.8	733
7	7	3698	3.8	15.4	.87/.88	3.3	13.4	685

IP12_004579

LOCATION = ECON EAST
FILE IDENTITY = IP6_26EEA

AVERAGE VELOCITY = 4216 FPM

AVERAGE (WEIGHTED) % O2 = 4.34 *
AVERAGE (WEIGHTED) % CO2 = 14.81 *
AVERAGE (WEIGHTED) TEMPERATURE = 742

AVERAGE (ARITHMETIC) % O2 = 4.32 *
AVERAGE (ARITHMETIC) % CO2 = 14.82 *
AVERAGE (ARITHMETIC) TEMPERATURE = 743

AVERAGE STATIC PRESSURE (in. H2O) = -3.3
AVERAGE DENSITY (LBM/FT^3) = .02882

ACFM (ACTUAL FT^3/MIN) = 1791676
LB/HR (WET) = 3098026

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED
NO. OF POINTS NOT USED = 8 OUT OF 49

IP12_004580

LOCATION = ECON EAST
FILE IDENTITY = IP6_26EEA

AVERAGE VELOCITY = 4216 FPM

AVERAGE (WEIGHTED) % O2 = 4.32
AVERAGE (WEIGHTED) % CO2 = 14.81
AVERAGE (WEIGHTED) TEMPERATURE = 742

AVERAGE (ARITHMETIC) % O2 = 4.29
AVERAGE (ARITHMETIC) % CO2 = 14.84
AVERAGE (ARITHMETIC) TEMPERATURE = 743

AVERAGE STATIC PRESSURE (in. H2O) = -3.3
AVERAGE DENSITY (LBM/FT^3) = .02882

ACFM (ACTUAL FT^3/MIN)
LB/HR (WET) = 1791676
= 3098026

DATE = 6-26-87
 LOCATION = ECON EAST
 FILE IDENTITY = IP6_26EEH
 BAROMETRIC PRESSURE = 25.49
 PROBE IDENTITY = E-8
 DUCT HEIGHT = 21.2
 DUCT WIDTH = 20.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
1	1	-3.4	748	.041	40	* 4.2	*14.6
1	2	-3.5	776	.046	50	3.0	16.0
1	3	-3.1	776	.634	60	3.8	15.4
1	4	-2.8	778	.595	60	3.2	15.8
1	5	-3.1	770	.432	60	2.8	16.4
1	6	-3.2	778	.356	50	3.6	15.6
1	7	-3.4	773	.197	35	4.0	15.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
2	1	-3.6	752	.043	40	3.2	15.8
2	2	-3.7	764	.053	30	2.8	16.2
2	3	-3.8	771	.217	30	2.8	16.2
2	4	-3.7	785	.241	40	2.8	16.4
2	5	-3.5	760	.166	40	3.6	15.6
2	6	-3.4	760	.119	60	3.6	15.4
2	7	-3.5	760	.124	50	4.0	15.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
3	1	-3.4	723	.043	40	2.8	16.0
3	2	-3.4	772	.139	40	3.4	15.8
3	3	-3.5	779	.390	30	2.6	16.4
3	4	-3.5	774	.517	40	2.6	16.4
3	5	-3.5	747	.461	30	3.4	15.6
3	6	-3.3	749	.368	50	4.0	15.4
3	7	-3.3	751	.151	40	3.8	15.2

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
4	1	-3.4	734	.039	40	3.2	15.8
4	2	-3.4	765	.087	0	3.0	16.0
4	3	-3.7	771	.732	40	2.0	17.0
4	4	-3.7	775	.388	40	2.2	16.8
4	5	-3.5	750	.444	30	3.4	15.8
4	6	-3.1	739	.310	50	3.6	15.8
4	7	-3.1	734	.209	60	3.2	15.8

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
5	1	-3.5	690	1.181	60	5.0	14.2
5	2	-3.5	764	.815	60	3.2	16.0
5	3	-3.6	775	.395	60	2.2	16.6
5	4	-3.7	762	.026	30	2.2	16.6
5	5	-3.6	759	.502	30	2.8	16.2
5	6	-3.6	744	.471	30	3.2	16.0
5	7	-3.4	739	.312	30	2.8	16.2

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
6	1	-3.3	715	.004	0	3.6	15.2
6	2	-3.2	746	.004	0	3.0	15.8
6	3	-3.2	749	.075	30	2.6	16.4
6	4	-2.8	746	.744	30	2.0	17.0
6	5	-2.8	752	.627	30	3.0	16.0
6	6	-2.7	749	.505	30	2.8	16.2
6	7	-2.8	751	.441	40	3.4	15.6

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
7	1	-3.4	711	.029	50	3.8	15.4
7	2	-3.2	738	.034	60	3.0	16.0
7	3	-3.4	730	.131	50	3.4	15.6
7	4	-3.0	728	.705	50	2.6	16.4
7	5	-3.0	741	.578	40	2.6	16.2
7	6	-3.0	746	.505	50	2.6	16.4
7	7	-3.0	749	.376	40	2.8	16.0

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED

 PRELIMINARY CALCULATIONS !!!!!!!
 FINAL CALCULATIONS TO BE RUN AFTER
 FECHHEIMER PROBES ARE
 INDEPENDENTLY CALIBRATED

DATE = 6-26-87
 LOCATION = ECON EAST
 FILE IDENTITY = IP6_26EEH
 BAROMETRIC PRESSURE = 25.49
 PROBE IDENTITY = E-8
 DUCT AREA = 425.0

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
1	1	1075	4.2	14.6	.42/.42	0.0	0.0	316
1	2	965	3.0	16.0	.37/.38	1.1	6.0	295
1	3	2760	3.8	15.4	1.07/1.09	4.1	16.5	842
1	4	2675	3.2	15.8	1.04/1.05	3.3	16.4	818
1	5	2275	2.8	16.4	.88/.89	2.5	14.5	689
1	6	2668	3.6	15.6	1.04/1.05	3.7	16.2	816
1	7	2533	4.0	15.0	.98/1.00	3.9	14.8	770

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
2	1	1102	3.2	15.8	.43/.43	1.4	6.8	326
2	2	1389	2.8	16.2	.54/.55	1.5	8.7	417
2	3	2805	2.8	16.2	1.09/1.10	3.1	17.7	850
2	4	2628	2.8	16.4	1.02/1.03	2.9	16.7	811
2	5	2162	3.6	15.6	.84/.85	3.0	13.1	646
2	6	1197	3.6	15.4	.46/.47	1.7	7.2	358
2	7	1571	4.0	15.0	.61/.62	2.4	9.2	470

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
3	1	1088	2.8	16.0	.42/.43	1.2	6.8	309
3	2	1989	3.4	15.8	.77/.78	2.6	12.2	604
3	3	3762	2.6	16.4	1.46/1.48	3.8	24.0	1152
3	4	3817	2.6	16.4	1.48/1.50	3.9	24.3	1161
3	5	4035	3.4	15.6	1.57/1.59	5.3	24.4	1184
3	6	2681	4.0	15.4	1.04/1.05	4.2	16.0	790
3	7	2056	3.8	15.2	.80/.81	3.0	12.1	607

IP12_004584

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
4	1	1041	3.2	15.8	.40/.41	1.3	6.4	301
4	2	2051	3.0	16.0	.80/.81	2.4	12.7	617
4	3	4527	2.0	17.0	1.76/1.78	3.5	29.9	1372
4	4	3313	2.2	16.8	1.29/1.30	2.8	21.6	1009
4	5	3965	3.4	15.8	1.54/1.56	5.2	24.3	1169
4	6	2450	3.6	15.8	.95/.96	3.4	15.0	712
4	7	1564	3.2	15.8	.61/.62	1.9	9.6	452
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
5	1	3625	5.0	14.2	1.41/1.43	7.0	20.0	983
5	2	3110	3.2	16.0	1.21/1.22	3.9	19.3	934
5	3	2182	2.2	16.6	.85/.86	1.9	14.1	664
5	4	973	2.2	16.6	.38/.38	.8	6.3	291
5	5	4229	2.8	16.2	1.64/1.66	4.6	26.6	1262
5	6	4072	3.2	16.0	1.58/1.60	5.1	25.3	1192
5	7	3312	2.8	16.2	1.29/1.30	3.6	20.8	963
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
6	1	433	3.6	15.2	.17/.17	.6	2.6	122
6	2	439	3.0	15.8	.17/.17	.5	2.7	129
6	3	1638	2.6	16.4	.64/.64	1.7	10.4	482
6	4	5099	2.0	17.0	1.98/2.00	4.0	33.7	1495
6	5	4703	3.0	16.0	1.83/1.85	5.5	29.2	1391
6	6	4217	2.8	16.2	1.64/1.66	4.6	26.5	1241
6	7	3494	3.4	15.6	1.36/1.37	4.6	21.2	1032
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
7	1	747	3.8	15.4	.29/.29	1.1	4.5	209
7	2	635	3.0	16.0	.25/.25	.7	3.9	184
7	3	1593	3.4	15.6	.62/.63	2.1	9.7	457
7	4	3661	2.6	16.4	1.42/1.44	3.7	23.3	1048
7	5	3978	2.6	16.2	1.55/1.56	4.0	25.0	1159
7	6	3127	2.6	16.4	1.21/1.23	3.2	19.9	917
7	7	3226	2.8	16.0	1.25/1.27	3.5	20.1	950

IP12_004585

LOCATION = ECON EAST
FILE IDENTITY = IP6_26EEH

AVERAGE VELOCITY = 2544 FPM

AVERAGE (WEIGHTED) % O2 = 3.04 *
AVERAGE (WEIGHTED) % CO2 = 16.01 *
AVERAGE (WEIGHTED) TEMPERATURE = 754

AVERAGE (ARITHMETIC) % O2 = 3.10 *
AVERAGE (ARITHMETIC) % CO2 = 15.93 *
AVERAGE (ARITHMETIC) TEMPERATURE = 753

AVERAGE STATIC PRESSURE (in. H2O) = -3.3
AVERAGE DENSITY (LBM/FT^3) = .02823

ACFM (ACTUAL FT^3/MIN) = 1081049
LB/HR (WET) = 1830859

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED
NO. OF POINTS NOT USED = 1 OUT OF 49

IP12_004586

LOCATION = ECON EAST
FILE IDENITY = IP6_26EEH

AVERAGE VELOCITY = 2544 FPM

AVERAGE (WEIGHTED) % O2 = 3.05
AVERAGE (WEIGHTED) % CO2 = 15.99
AVERAGE (WEIGHTED) TEMPERATURE = 754

AVERAGE (ARITHMETIC) % O2 = 3.13
AVERAGE (ARITHMETIC) % CO2 = 15.90
AVERAGE (ARITHMETIC) TEMPERATURE = 753

AVERAGE STATIC PRESSURE (in. H2O) = -3.3
AVERAGE DENSITY (LBM/FT^3) = .02823

ACFM (ACTUAL FT^3/MIN) = 1081049
LB/HR (WET) = 1830859

6/24/81 CW AH Test, Econ Loc.

~~LOCATION~~
~~FILE IDENTITY~~

= BAG IN EAST
= IP6_24BHE

AVERAGE VELOCITY = 4060 FPM

AVERAGE (WEIGHTED) % O2 = 4.99
AVERAGE (WEIGHTED) % CO2 = 14.06
AVERAGE (WEIGHTED) TEMPERATURE = 317

AVERAGE (ARITHMETIC) % O2 = 4.98
AVERAGE (ARITHMETIC) % CO2 = 14.06
AVERAGE (ARITHMETIC) TEMPERATURE = 317

AVERAGE STATIC PRESSURE (in. H2O) = -8.2
AVERAGE DENSITY (LBM/FT³) = .04325

ACFM (ACTUAL FT³/MIN) = 1406672
LB/HR (WET) = 3650010

IP12_004588

DATE = 6/24/87
 LOCATION = ECON WEST A_G
 FILE IDENTITY = IP624_EWAG
 BAROMETRIC PRESSURE = 25.53
 PROBE IDENTITY = E-43
 DUCT HEIGHT = 21.2
 DUCT WIDTH = 20.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
1	1	-3.4	715	.041	5	7.6	12.0
1	2	-3.4	743	.051	0	5.0	14.2
1	3	-3.5	740	.043	10	5.6	13.7
1	4	-3.6	741	.015	15	3.4	15.8
1	5	-3.3	727	.295	40	4.1	15.1
1	6	-3.4	722	.244	35	3.7	15.4
1	7	-3.1	720	.229	30	* 3.0	*15.4

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
2	1	-3.4	749	.040	5	5.0	14.2
2	2	-3.4	751	.046	5	5.2	14.0
2	3	-3.4	746	.052	15	5.0	14.3
2	4	-3.4	738	.335	25	3.1	15.9
2	5	-3.4	741	.310	25	3.7	15.6
2	6	-3.5	732	.345	10	3.2	16.2
2	7	-3.4	732	.302	5	* 3.3	*16.6

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
3	1	-3.4	757	.043	5	4.9	14.3
3	2	-3.3	759	.122	35	5.3	14.4
3	3	-3.3	750	.136	30	4.6	14.5
3	4	-3.3	749	.253	30	3.0	16.0
3	5	-3.2	753	.307	30	3.4	16.0
3	6	-3.1	742	.366	20	3.2	16.0
3	7	-3.3	744	.273	20	3.2	15.9

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
4	1	-3.4	758	.042	5	4.0	15.4
4	2	-3.4	761	.168	20	4.3	14.9
4	3	-3.2	762	.336	20	3.6	15.6
4	4	-3.4	758	.335	35	2.9	16.2
4	5	-3.3	756	.322	30	2.7	16.3
4	6	-3.4	743	.330	20	3.2	16.0
4	7	3.3	747	.305	10	3.0	16.0

IP12_004589

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
5	1	-3.6	755	.198	50	3.7	15.5
5	2	-3.5	761	.335	30	3.6	15.6
5	3	-3.4	760	.395	25	3.6	15.6
5	4	-3.3	754	.373	30	3.3	15.7
5	5	-3.2	747	.334	5	3.1	16.2
5	6	-3.2	740	.232	15	3.2	15.8
5	7	-3.1	738	.227	5	3.8	15.7

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
6	1	-3.4	730	.185	30	3.5	15.7
6	2	-3.4	756	.310	40	3.8	15.3
6	3	-3.5	753	.302	10	3.1	16.2
6	4	-3.3	754	.286	5	3.2	16.0
6	5	-3.5	753	.207	10	3.1	16.2
6	6	-3.3	756	.225	40	3.7	15.4
6	7	-3.5	739	.141	0	3.1	16.1

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
7	1	-3.3	731	.097	40	6.1	13.5
7	2	-3.3	762	.273	5	3.8	15.4
7	3	-3.4	760	.349	20	4.1	15.4
7	4	-3.3	758	.363	10	3.4	15.6
7	5	-3.4	762	.295	25	3.1	16.0
7	6	-3.2	765	.324	35	3.1	16.1
7	7	-3.4	765	.133	40	3.7	15.7

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED

PRELIMINARY CALCULATIONS !!!!!!!
FINAL CALCULATIONS TO BE RUN AFTER
FECHHEIMER PROBES ARE
INDEPENDENTLY CALIBRATED

DATE = 6/24/87
LOCATION = ECON WEST A_G
FILE IDENTITY = IP624_EWAG
BAROMETRIC PRESSURE = 25.53
PROBE IDENTITY = E-43
DUCT AREA = 425.0

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
1	1	1382	7.6	12.0	.49/.48	3.7	5.8	346
1	2	1562	5.0	14.2	.55/.55	2.7	7.8	406
1	3	1412	5.6	13.7	.50/.49	2.8	6.8	366
1	4	819	3.4	15.8	.29/.29	1.0	4.6	212
1	5	2839	4.1	15.1	1.00/.99	4.1	15.1	722
1	6	2757	3.7	15.4	.97/.96	3.6	14.9	696
1	7	2822	3.0	15.4	.99/.99	0.0	0.0	711

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
2	1	1383	5.0	14.2	.49/.48	2.4	6.9	362
2	2	1484	5.2	14.0	.52/.52	2.7	7.3	389
2	3	1526	5.0	14.3	.54/.53	2.7	7.7	398
2	4	3593	3.1	15.9	1.26/1.26	3.9	20.1	927
2	5	3463	3.7	15.6	1.22/1.21	4.5	19.0	898
2	6	3950	3.2	16.2	1.39/1.38	4.4	22.5	1012
2	7	3737	3.3	16.6	1.31/1.31	0.0	0.0	956

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
3	1	1438	4.9	14.3	.51/.50	2.5	7.2	381
3	2	1987	5.3	14.4	.70/.69	3.7	10.1	527
3	3	2209	4.6	14.5	.78/.77	3.6	11.3	579
3	4	3001	3.0	16.0	1.06/1.05	3.2	16.9	786
3	5	3306	3.4	16.0	1.16/1.16	4.0	18.6	870
3	6	3897	3.2	16.0	1.37/1.36	4.4	21.9	1011
3	7	3373	3.2	15.9	1.19/1.18	3.8	18.9	877

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
4	1	1420	4.0	15.4	.50/.50	2.0	7.7	376
4	2	2673	4.3	14.9	.94/.93	4.0	14.0	711
4	3	3767	3.6	15.6	1.33/1.32	4.8	20.7	1003
4	4	3273	2.9	16.2	1.15/1.14	3.3	18.7	867
4	5	3390	2.7	16.3	1.19/1.19	3.2	19.4	896
4	6	3705	3.2	16.0	1.30/1.30	4.2	20.9	963
4	7	3704	3.0	16.0	1.30/1.30	3.9	20.9	967
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
5	1	1979	3.7	15.5	.70/.69	2.6	10.8	522
5	2	3468	3.6	15.6	1.22/1.21	4.4	19.0	923
5	3	3935	3.6	15.6	1.38/1.38	5.0	21.6	1046
5	4	3646	3.3	15.7	1.28/1.27	4.2	20.1	961
5	5	3955	3.1	16.2	1.39/1.38	4.3	22.5	1033
5	6	3194	3.2	15.8	1.12/1.12	3.6	17.8	827
5	7	3254	3.8	15.7	1.14/1.14	4.4	18.0	840
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
6	1	2549	3.5	15.7	.90/.89	3.1	14.1	650
6	2	2946	3.8	15.3	1.04/1.03	3.9	15.9	779
6	3	3730	3.1	16.2	1.31/1.30	4.1	21.3	982
6	4	3675	3.2	16.0	1.29/1.28	4.1	20.7	969
6	5	3094	3.1	16.2	1.09/1.08	3.4	17.6	814
6	6	2513	3.7	15.4	.88/.88	3.3	13.6	664
6	7	2581	3.1	16.1	.91/.90	2.8	14.6	666
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
7	1	1640	6.1	13.5	.58/.57	3.5	7.8	419
7	2	3605	3.8	15.4	1.27/1.26	4.8	19.5	961
7	3	3838	4.1	15.4	1.35/1.34	5.5	20.8	1020
7	4	4097	3.4	15.6	1.44/1.43	4.9	22.5	1086
7	5	3407	3.1	16.0	1.20/1.19	3.7	19.2	908
7	6	3228	3.1	16.1	1.14/1.13	3.5	18.3	863
7	7	1942	3.7	15.7	.68/.68	2.5	10.7	519

LOCATION = ECON WEST A_G
FILE IDENTITY = IP624_EWAG

AVERAGE VELOCITY = 2860 FPM

AVERAGE (WEIGHTED) % O2 = 3.64 *
AVERAGE (WEIGHTED) % CO2 = 15.57 *
AVERAGE (WEIGHTED) TEMPERATURE = 748

AVERAGE (ARITHMETIC) % O2 = 3.85 *
AVERAGE (ARITHMETIC) % CO2 = 15.37 *
AVERAGE (ARITHMETIC) TEMPERATURE = 748

AVERAGE STATIC PRESSURE (in. H2O) = -3.2
AVERAGE DENSITY (LBM/FT^3) = .02829

ACFM (ACTUAL FT^3/MIN) = 1215593
LB/HR (WET) = 2063453

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED
NO. OF POINTS NOT USED = 2 OUT OF 49

IP12_004593

LOCATION = ECON WEST A_G
FILE IDENTITY = IP624_EWAG

AVERAGE VELOCITY = 2860 FPM

AVERAGE (WEIGHTED) % O2 = 3.61
AVERAGE (WEIGHTED) % CO2 = 15.60
AVERAGE (WEIGHTED) TEMPERATURE = 748

AVERAGE (ARITHMETIC) % O2 = 3.82
AVERAGE (ARITHMETIC) % CO2 = 15.40
AVERAGE (ARITHMETIC) TEMPERATURE = 748

AVERAGE STATIC PRESSURE (in. H2O) = -3.2
AVERAGE DENSITY (LBM/FT³) = .02829

ACFM (ACTUAL FT³/MIN) = 1215593
LB/HR (WET) = 2063453

DATE - 6/24/87
 LOCATION - ECON WEST H_N
 FILE IDENTITY - IP624_EWHN
 BAROMETRIC PRESSURE - 25.53
 PROBE IDENTITY - E-6
 DUCT HEIGHT - 21.2
 DUCT WIDTH - 20.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
1	1	-2.5	728	0.000	0	4.4	14.6
1	2	-2.5	760	0.000	0	3.6	15.6
1	3	-2.6	762	0.000	0	2.3	16.4
1	4	-2.8	762	.481	30	3.0	16.0
1	5	-2.7	765	.400	30	3.3	15.8
1	6	-2.7	779	.397	40	3.3	15.8
1	7	-2.6	771	.258	30	3.8	14.9

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
2	1	-2.5	733	0.000	0	6.6	12.9
2	2	-2.5	761	0.000	0	3.4	15.4
2	3	-2.7	766	0.000	0	3.6	15.4
2	4	-2.8	759	.432	25	* 3.9	*14.8
2	5	-2.8	765	.351	35	3.6	15.3
2	6	-2.8	765	.424	30	3.2	15.8
2	7	-2.6	770	.141	20	3.2	15.6

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
3	1	-2.5	751	0.000	0	3.8	15.0
3	2	-2.6	760	0.000	0	4.4	15.0
3	3	-2.8	765	.302	5	3.7	15.3
3	4	-2.7	753	.256	15	3.8	15.4
3	5	-2.8	760	.351	30	4.0	15.2
3	6	-2.6	755	.358	20	4.4	14.8
3	7	-2.5	760	.253	5	3.8	15.2

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
4	1	-2.4	755	0.000	0	5.0	14.2
4	2	-2.5	760	0.000	0	4.3	14.8
4	3	-2.5	760	.180	5	4.0	15.2
4	4	-2.7	754	.459	30	4.1	14.9
4	5	-2.6	758	.153	20	3.8	15.2
4	6	2.7	755	.244	20	4.0	15.0
4	7	-2.6	753	.271	35	3.9	15.2

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
5	1	-2.3	744	0.000	0	4.9	14.0
5	2	-2.6	756	0.000	0	4.0	15.0
5	3	-2.5	752	.712	20	4.0	15.2
5	4	-2.6	755	.051	10	4.0	15.0
5	5	-2.6	746	.349	30	4.8	14.4
5	6	-2.6	753	.415	30	4.2	14.8
5	7	-2.5	754	.297	10	4.4	14.8

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
6	1	-2.6	752	0.000	0	4.6	14.4
6	2	-2.6	757	0.000	30	4.4	14.8
6	3	-2.8	752	.273	15	4.3	14.8
6	4	-2.8	753	.295	40	4.4	14.8
6	5	-2.8	753	.295	40	4.3	14.9
6	6	-2.8	753	.285	20	3.4	15.9
6	7	-2.6	754	.239	15	3.9	14.9

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
7	1	-2.6	746	0.000	40	3.8	15.4
7	2	-2.8	751	.380	20	4.3	14.6
7	3	-2.9	752	.131	20	3.8	15.4
7	4	-2.7	750	.190	30	4.2	14.8
7	5	-2.8	748	.415	35	4.0	15.0
7	6	-2.7	749	.395	40	3.8	15.3
7	7	-2.5	754	.263	25	3.6	15.4

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED

PRELIMINARY CALCULATIONS !!!!!!!
FINAL CALCULATIONS TO BE RUN AFTER
FECHHEIMER PROBES ARE
INDEPENDENTLY CALIBRATED

DATE - 6/24/87
LOCATION - ECON WEST H_N
FILE IDENTITY - IP624_EWHN
BAROMETRIC PRESSURE - 25.53
PROBE IDENTITY - E-6
DUCT AREA - 425.0

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
1	1	0	4.4	14.6	0.00/0.00	0.0	0.0	0
1	2	0	3.6	15.6	0.00/0.00	0.0	0.0	0
1	3	0	2.3	16.4	0.00/0.00	0.0	0.0	0
1	4	4145	3.0	16.0	1.77/1.77	5.3	28.3	1347
1	5	3788	3.3	15.8	1.62/1.62	5.3	25.5	1236
1	6	3358	3.3	15.8	1.43/1.43	4.7	22.6	1116
1	7	3058	3.8	14.9	1.30/1.30	5.0	19.4	1006
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
2	1	0	6.6	12.9	0.00/0.00	0.0	0.0	0
2	2	0	3.4	15.4	0.00/0.00	0.0	0.0	0
2	3	0	3.6	15.4	0.00/0.00	0.0	0.0	0
2	4	4113	3.9	14.8	1.75/1.75	6.8	26.0	1331
2	5	3360	3.6	15.3	1.43/1.43	5.2	21.9	1096
2	6	3899	3.2	15.8	1.66/1.66	5.3	26.3	1272
2	7	2456	3.2	15.6	1.05/1.05	3.4	16.3	806
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
3	1	0	3.8	15.0	0.00/0.00	0.0	0.0	0
3	2	0	4.4	15.0	0.00/0.00	0.0	0.0	0
3	3	3793	3.7	15.3	1.62/1.62	6.0	24.7	1237
3	4	3370	3.8	15.4	1.44/1.44	5.5	22.1	1082
3	5	3545	4.0	15.2	1.51/1.51	6.0	23.0	1149
3	6	3876	4.4	14.8	1.65/1.65	7.3	24.5	1248
3	7	3466	3.8	15.2	1.48/1.48	5.6	22.5	1123

TAP	POINT	CORR	V	%O2	% CO2	V	LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
4	1	0	5.0		14.2	0.00/0.00	0.0	0.0	0.0	0
4	2	0	4.3		14.8	0.00/0.00	0.0	0.0	0.0	0
4	3	2927	4.0		15.2	1.25/1.25	5.0	19.0	948	
4	4	4040	4.1		14.9	1.72/1.72	7.1	25.7	1300	
4	5	2546	3.8		15.2	1.09/1.09	4.1	16.5	823	
4	6	3181	4.0		15.0	1.36/1.36	5.4	20.3	1025	
4	7	2941	3.9		15.2	1.25/1.25	4.9	19.1	945	

TAP	POINT	CORR	V	%O2	% CO2	V	LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
5	1	0	4.9		14.0	0.00/0.00	0.0	0.0	0.0	0
5	2	0	4.0		15.0	0.00/0.00	0.0	0.0	0.0	0
5	3	5438	4.0		15.2	2.32/2.32	9.3	35.2	1743	
5	4	1544	4.0		15.0	.66/.66	2.6	9.9	497	
5	5	3515	4.8		14.4	1.50/1.50	7.2	21.6	1117	
5	6	3841	4.2		14.8	1.64/1.64	6.9	24.2	1233	
5	7	3702	4.4		14.8	1.58/1.58	6.9	23.4	1191	

TAP	POINT	CORR	V	%O2	% CO2	V	LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
6	1	0	4.6		14.4	0.00/0.00	0.0	0.0	0.0	0
6	2	0	4.4		14.8	0.00/0.00	0.0	0.0	0.0	0
6	3	3481	4.3		14.8	1.48/1.48	6.4	22.0	1116	
6	4	2870	4.4		14.8	1.22/1.22	5.4	18.1	922	
6	5	2869	4.3		14.9	1.22/1.22	5.3	18.2	921	
6	6	3457	3.4		15.9	1.47/1.47	5.0	23.4	1110	
6	7	3260	3.9		14.9	1.39/1.39	5.4	20.7	1048	

TAP	POINT	CORR	V	%O2	% CO2	V	LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
7	1	0	3.8		15.4	0.00/0.00	0.0	0.0	0.0	0
7	2	3988	4.3		14.6	1.70/1.70	7.3	24.8	1277	
7	3	2351	3.8		15.4	1.00/1.00	3.8	15.4	754	
7	4	2605	4.2		14.8	1.11/1.11	4.7	16.4	833	
7	5	3625	4.0		15.0	1.55/1.55	6.2	23.2	1156	
7	6	3308	3.8		15.3	1.41/1.41	5.4	21.6	1056	
7	7	3206	3.6		15.4	1.37/1.37	4.9	21.1	1031	

LOCATION - ECON WEST H_N
FILE IDENTITY - IP624_EWHN

AVERAGE VELOCITY - 2345 FPM

AVERAGE (WEIGHTED) % O2 - 3.89 *
AVERAGE (WEIGHTED) % CO2 - 15.16 *
AVERAGE (WEIGHTED) TEMPERATURE - 757

AVERAGE (ARITHMETIC) % O2 - 3.99 *
AVERAGE (ARITHMETIC) % CO2 - 15.07 *
AVERAGE (ARITHMETIC) TEMPERATURE - 756

AVERAGE STATIC PRESSURE (in. H2O) - -2.5
AVERAGE DENSITY (LBM/FT^3) - .02814

ACFM (ACTUAL FT^3/MIN) - 996735
LB/HR (WET) - 1682911

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED
NO. OF POINTS NOT USED = 0 OUT OF 49

IP12_004599

LOCATION = ECON WEST H_N
FILE IDENTITY = IP624_EWHN

AVERAGE VELOCITY = 2345 FPM

AVERAGE (WEIGHTED) % O2 = 3.89
AVERAGE (WEIGHTED) % CO2 = 15.16
AVERAGE (WEIGHTED) TEMPERATURE = 757

AVERAGE (ARITHMETIC) % O2 = 3.99
AVERAGE (ARITHMETIC) % CO2 = 15.07
AVERAGE (ARITHMETIC) TEMPERATURE = 756

AVERAGE STATIC PRESSURE (in. H2O) = -2.5
AVERAGE DENSITY (LBM/FT³) = .02814

ACFM (ACTUAL FT³/MIN) = 996735
LB/HR (WET) = 1682911

DATE = 6/24/87
 LOCATION = ECON EAST A_G
 FILE IDENTITY = IP624_EEAG
 BAROMETRIC PRESSURE = 25.53
 PROBE IDENTITY = #28
 DUCT HEIGHT = 21.2
 DUCT WIDTH = 20.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
1	1	-3.2	742	1.019	50	3.8	15.3
1	2	-3.2	740	.710	8	4.2	14.8
1	3	-3.0	736	.493	10	3.9	15.1
1	4	-3.1	737	.065	25	3.8	15.2
1	5	-3.0	733	.166	25	3.8	15.2
1	6	-2.8	736	.407	10	3.8	15.2
1	7	-2.8	748	.290	20	3.6	15.4
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
2	1	-3.0	737	.473	50	4.0	15.0
2	2	-3.1	745	.219	20	3.6	15.4
2	3	-3.1	734	.219	20	3.6	15.4
2	4	-3.1	740	.061	20	4.3	14.7
2	5	-3.1	739	.273	15	3.7	15.3
2	6	-3.1	745	.542	5	4.1	14.9
2	7	-3.1	748	.310	5	4.2	14.8
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
3	1	-3.1	724	1.257	25	* 4.9	*15.0
3	2	-3.0	757	1.106	0	3.8	15.2
3	3	-3.0	748	.385	10	3.5	15.4
3	4	-3.0	749	.039	15	4.3	14.7
3	5	-3.0	753	.366	15	4.3	14.7
3	6	-3.0	749	.371	10	4.3	14.7
3	7	-3.0	742	.327	5	4.0	15.0
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
4	1	-3.0	621	1.684	10	4.0	14.9
4	2	-3.0	755	.871	0	4.3	14.7
4	3	-3.0	760	.341	0	3.6	15.4
4	4	-3.0	753	.014	5	3.6	15.4
4	5	-3.0	761	.424	5	3.8	15.2
4	6	-3.0	761	1.499	5	3.8	15.2
4	7	-3.0	762	1.709	5	4.2	14.8

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
5	1	-3.3	738	1.025	15	4.0	14.9
5	2	-3.3	756	.585	0	4.0	15.0
5	3	-3.4	758	.180	5	4.0	15.0
5	4	-3.1	761	.278	5	3.6	15.4
5	5	-3.1	763	.312	0	4.1	14.8
5	6	-3.1	759	.341	10	4.0	15.0
5	7	-3.0	757	.294	10	4.3	14.7

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
6	1	-3.3	719	1.516	0	4.2	15.0
6	2	-3.2	767	.959	0	3.0	16.0
6	3	-3.2	765	.466	0	2.8	16.2
6	4	-3.2	761	.258	5	3.6	15.4
6	5	-3.1	763	.031	0	3.6	15.4
6	6	-3.1	762	.302	5	3.7	15.2
6	7	-2.9	760	.476	15	* 4.0	*14.6

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
7	1	-3.1	752	1.452	0	4.0	15.0
7	2	-2.9	752	.937	5	3.4	15.6
7	3	-3.0	760	.224	0	3.6	15.6
7	4	-3.0	760	.129	0	3.6	15.6
7	5	-3.0	763	.365	0	4.0	15.2
7	6	-3.0	774	.329	5	4.0	15.0
7	7	-2.9	771	.371	25	4.0	15.0

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED

PRELIMINARY CALCULATIONS !!!!!!!
FINAL CALCULATIONS TO BE RUN AFTER
FECHHEIMER PROBES ARE
INDEPENDENTLY CALIBRATED

DATE = 6/24/87
LOCATION = ECON EAST A_G
FILE IDENTITY = IP624_EEAG
BAROMETRIC PRESSURE = 25.53
PROBE IDENTITY = #28
DUCT AREA = 425.0

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
1	1	4428	3.8	15.3	1.01/.99	3.8	15.4	737
1	2	5704	4.2	14.8	1.30/1.28	5.4	19.2	948
1	3	4725	3.9	15.1	1.07/1.06	4.2	16.2	781
1	4	1591	3.8	15.2	.36/.36	1.4	5.5	263
1	5	2531	3.8	15.2	.58/.57	2.2	8.7	416
1	6	4294	3.8	15.2	.98/.96	3.7	14.8	709
1	7	3482	3.6	15.4	.79/.78	2.8	12.2	585
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
2	1	3023	4.0	15.0	.69/.68	2.7	10.3	500
2	2	3026	3.6	15.4	.69/.68	2.5	10.6	506
2	3	3012	3.6	15.4	.68/.68	2.5	10.5	496
2	4	1602	4.3	14.7	.36/.36	1.6	5.4	266
2	5	3461	3.7	15.3	.79/.78	2.9	12.0	574
2	6	5029	4.1	14.9	1.14/1.13	4.7	17.0	841
2	7	3819	4.2	14.8	.87/.86	3.6	12.8	641
TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
3	1	6872	4.9	15.0	1.56/1.54	0.0	0.0	1117
3	2	7220	3.8	15.2	1.64/1.62	6.2	24.9	1227
3	3	4200	3.5	15.4	.95/.94	3.3	14.7	705
3	4	1323	4.3	14.7	.30/.30	1.3	4.4	222
3	5	4028	4.3	14.7	.92/.90	3.9	13.5	681
3	6	4128	4.3	14.7	.94/.93	4.0	13.8	694
3	7	3910	4.0	15.0	.89/.88	3.6	13.3	651

TAP	POINT	CORR	V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
4	1	8241	4.0	14.9	14.9	1.87/1.85	7.5	27.9	1149
4	2	6412	4.3	14.7	14.7	1.46/1.44	6.3	21.4	1087
4	3	4036	3.6	15.4	15.4	.92/.91	3.3	14.1	689
4	4	820	3.6	15.4	15.4	.19/.18	.7	2.9	139
4	5	4482	3.8	15.2	15.2	1.02/1.01	3.9	15.5	766
4	6	8374	3.8	15.2	15.2	1.90/1.88	7.2	28.9	1431
4	7	8943	4.2	14.8	14.8	2.03/2.01	8.5	30.1	1530

TAP	POINT	CORR	V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
5	1	6667	4.0	14.9	14.9	1.52/1.50	6.1	22.6	1105
5	2	5269	4.0	15.0	15.0	1.20/1.18	4.8	18.0	894
5	3	2929	4.0	15.0	15.0	.67/.66	2.7	10.0	498
5	4	3636	3.6	15.4	15.4	.83/.82	3.0	12.7	621
5	5	3870	4.1	14.8	14.8	.88/.87	3.6	13.0	663
5	6	3975	4.0	15.0	15.0	.90/.89	3.6	13.6	677
5	7	3691	4.3	14.7	14.7	.84/.83	3.6	12.3	627

TAP	POINT	CORR	V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
6	1	8307	4.2	15.0	15.0	1.89/1.86	7.9	28.3	1341
6	2	6753	3.0	16.0	16.0	1.53/1.52	4.6	24.6	1163
6	3	4719	2.8	16.2	16.2	1.07/1.06	3.0	17.4	810
6	4	3504	3.6	15.4	15.4	.80/.79	2.9	12.3	599
6	5	1228	3.6	15.4	15.4	.28/.28	1.0	4.3	210
6	6	3790	3.7	15.2	15.2	.86/.85	3.2	13.1	648
6	7	4603	4.0	14.6	14.6	1.05/1.03	0.0	0.0	785

TAP	POINT	CORR	V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
7	1	8246	4.0	15.0	15.0	1.87/1.85	7.5	28.1	1392
7	2	6608	3.4	15.6	15.6	1.50/1.48	5.1	23.4	1116
7	3	3275	3.6	15.6	15.6	.74/.74	2.7	11.6	559
7	4	2491	3.6	15.6	15.6	.57/.56	2.0	8.8	425
7	5	4180	4.0	15.2	15.2	.95/.94	3.8	14.4	716
7	6	3975	4.0	15.0	15.0	.90/.89	3.6	13.6	691
7	7	3832	4.0	15.0	15.0	.87/.86	3.5	13.1	663

LOCATION = ECON EAST A_G
FILE IDENTITY = IP624_EEAG

AVERAGE VELOCITY = 4454 FPM

AVERAGE (WEIGHTED) % O2 = 3.87 *
AVERAGE (WEIGHTED) % CO2 = 15.14 *
AVERAGE (WEIGHTED) TEMPERATURE = 746

AVERAGE (ARITHMETIC) % O2 = 3.86 *
AVERAGE (ARITHMETIC) % CO2 = 15.15 *
AVERAGE (ARITHMETIC) TEMPERATURE = 748

AVERAGE STATIC PRESSURE (in. H2O) = -3.1
AVERAGE DENSITY (LBM/FT^3) = .02827

ACFM (ACTUAL FT^3/MIN) = 1893098
LB/HR (WET) = 3211499

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED
NO. OF POINTS NOT USED = 2 OUT OF 49

IP12_004605

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
5	1	-3.0	684	.031	30	3.2	15.8
5	2	-3.0	766	.039	30	2.8	16.0
5	3	-2.9	764	.393	80	2.8	16.2
5	4	-2.7	756	.620	35	3.0	16.2
5	5	-2.7	766	.532	45	3.6	15.6
5	6	-3.2	767	.485	25	3.2	16.0
5	7	-3.0	765	.380	20	3.4	15.6

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
6	1	-3.1	723	.075	25	* 3.8	*15.8
6	2	-3.2	761	.019	40	3.4	15.8
6	3	-3.3	759	.009	40	3.2	15.8
6	4	-3.4	744	.227	40	2.2	16.8
6	5	-3.4	754	.224	45	2.8	16.4
6	6	-3.2	745	.205	40	3.0	16.2
6	7	-3.2	753	.078	40	3.0	16.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
7	1	-3.0	670	.019	40	4.2	15.2
7	2	-3.1	757	.014	45	3.4	15.6
7	3	-3.1	756	.019	45	3.2	15.8
7	4	-3.1	746	.019	40	2.8	16.0
7	5	-2.9	723	.432	50	2.6	16.4
7	6	-3.2	727	.302	35	3.0	16.2
7	7	-3.2	736	.031	90	3.0	16.0

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED

PRELIMINARY CALCULATIONS !!!!!!!
FINAL CALCULATIONS TO BE RUN AFTER
FECHHEIMER PROBES ARE
INDEPENDENTLY CALIBRATED

DATE - 6/24/87
LOCATION - ECON EAST I_N
FILE IDENTITY - IP624_EEHN
BAROMETRIC PRESSURE - 25.53
PROBE IDENTITY - E-8
DUCT AREA - 425.0

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
1	1	833	3.8	15.4	.42/.42	1.6	6.4	285
1	2	4288	3.0	16.0	2.14/2.15	6.4	34.2	1646
1	3	1859	3.4	15.6	.93/.93	3.2	14.5	711
1	4	3186	4.2	15.0	1.59/1.59	6.7	23.8	1209
1	5	2306	3.6	15.2	1.15/1.15	4.1	17.5	878
1	6	2667	3.6	15.4	1.33/1.33	4.8	20.5	1035
1	7	2719	4.2	15.0	1.36/1.36	5.7	20.3	1046

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
2	1	480	3.6	15.6	.24/.24	.9	3.7	182
2	2	2034	3.2	16.0	1.01/1.02	3.2	16.2	778
2	3	2495	4.0	15.0	1.24/1.25	5.0	18.7	953
2	4	1860	4.2	15.0	.93/.93	3.9	13.9	705
2	5	1914	4.0	15.2	.95/.96	3.8	14.5	727
2	6	3734	4.0	15.0	1.86/1.87	7.4	27.9	1428
2	7	1831	3.8	15.4	.91/.92	3.5	14.1	689

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
3	1	1426	3.6	15.6	.71/.71	2.6	11.1	542
3	2	476	3.2	15.8	.24/.24	.8	3.8	182
3	3	1981	3.2	16.0	.99/.99	3.2	15.8	762
3	4	2528	3.4	15.6	1.26/1.26	4.3	19.7	973
3	5	1962	3.6	15.4	.98/.98	3.5	15.1	751
3	6	1558	3.6	15.6	.78/.78	2.8	12.1	591
3	7	1152	3.4	15.4	.57/.58	2.0	8.8	432

LOCATION - ECON EAST A_G
FILE IDENTITY - IP624_EEAG

AVERAGE VELOCITY - 4454 FPM

AVERAGE (WEIGHTED) % O2 - 3.91
AVERAGE (WEIGHTED) % CO2 - 15.12
AVERAGE (WEIGHTED) TEMPERATURE - 746

AVERAGE (ARITHMETIC) % O2 - 3.88
AVERAGE (ARITHMETIC) % CO2 - 15.13
AVERAGE (ARITHMETIC) TEMPERATURE - 748

AVERAGE STATIC PRESSURE (in. H2O) - -3.1
AVERAGE DENSITY (LBM/FT^3) - .02827

ACFM (ACTUAL FT^3/MIN) - 1893098
LB/HR (WET) - 3211499

IP12_004608

DATE = 6/24/87
 LOCATION = ECON EAST I_N
 FILE IDENTITY = IP624_EEHN
 BAROMETRIC PRESSURE = 25.53
 PROBE IDENTITY = E-8
 DUCT HEIGHT = 21.2
 DUCT WIDTH = 20.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
1	1	-3.0	685	.026	40	3.8	15.4
1	2	-3.3	767	.383	0	3.0	16.0
1	3	-2.7	765	.620	70	3.4	15.6
1	4	-2.6	759	.517	50	4.2	15.0
1	5	-2.6	761	.446	60	3.6	15.2
1	6	-2.6	776	.356	50	3.6	15.4
1	7	-2.8	769	.173	20	4.2	15.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
2	1	-3.2	759	.019	60	3.6	15.6
2	2	-2.9	765	.744	70	3.2	16.0
2	3	-2.8	763	.522	60	4.0	15.0
2	4	-2.8	758	.290	60	4.2	15.0
2	5	-2.9	759	.307	60	4.0	15.2
2	6	-2.9	764	.388	30	4.0	15.0
2	7	-3.0	752	.170	50	3.8	15.4

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
3	1	-3.4	760	.056	30	3.6	15.6
3	2	-3.2	764	.156	80	3.2	15.8
3	3	-2.8	769	.703	70	3.2	16.0
3	4	-2.7	769	.534	60	3.4	15.6
3	5	-2.8	765	.451	65	3.6	15.4
3	6	-2.7	758	.437	70	3.6	15.6
3	7	-2.8	749	.239	70	3.4	15.4

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
4	1	-3.0	755	.009	30	3.0	16.0
4	2	-3.0	771	.341	80	3.0	16.2
4	3	-2.7	768	.673	60	2.6	16.6
4	4	-2.7	766	.432	45	3.4	15.8
4	5	-2.6	770	.512	50	3.0	16.0
4	6	-2.6	759	.473	50	3.0	16.0
4	7	-2.7	746	.410	70	3.0	15.8

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
4	1	572	3.0	16.0	.29/.29	.9	4.6	216
4	2	703	3.0	16.2	.35/.35	1.1	5.7	271
4	3	2831	2.6	16.6	1.41/1.42	3.7	23.4	1088
4	4	3214	3.4	15.8	1.60/1.61	5.4	25.3	1232
4	5	3183	3.0	16.0	1.59/1.59	4.8	25.4	1226
4	6	3046	3.0	16.0	1.52/1.52	4.6	24.3	1156
4	7	1502	3.0	15.8	.75/.75	2.2	11.8	560

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
5	1	1028	3.2	15.8	.51/.51	1.6	8.1	352
5	2	1193	2.8	16.0	.59/.60	1.7	9.5	457
5	3	753	2.8	16.2	.38/.38	1.1	6.1	288
5	4	4432	3.0	16.2	2.21/2.22	6.6	35.8	1675
5	5	3563	3.6	15.6	1.78/1.78	6.4	27.7	1365
5	6	4366	3.2	16.0	2.18/2.18	7.0	34.8	1674
5	7	4010	3.4	15.6	2.00/2.01	6.8	31.2	1535

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
6	1	1698	3.8	15.8	.85/.85	0.0	0.0	614
6	2	736	3.4	15.8	.37/.37	1.2	5.8	280
6	3	507	3.2	15.8	.25/.25	.8	4.0	192
6	4	2508	2.2	16.8	1.25/1.25	2.8	21.0	933
6	5	2310	2.8	16.4	1.15/1.16	3.2	18.9	872
6	6	2386	3.0	16.2	1.19/1.19	3.6	19.3	889
6	7	1482	3.0	16.0	.74/.74	2.2	11.8	559

TAP	POINT	CORR V	%O2	% CO2	V LOC/AVG	WTD % O2	WTD %CO2	WTD TEMP
7	1	708	4.2	15.2	.35/.35	1.5	5.4	237
7	2	583	3.4	15.6	.29/.29	1.0	4.5	221
7	3	678	3.2	15.8	.34/.34	1.1	5.3	256
7	4	732	2.8	16.0	.36/.37	1.0	5.8	273
7	5	2869	2.6	16.4	1.43/1.44	3.7	23.5	1038
7	6	3068	3.0	16.2	1.53/1.54	4.6	24.8	1117
7	7	0	3.0	16.0	0.00/0.00	0.0	0.0	0

LOCATION = ECON EAST I_N
FILE IDENTITY = IP624_EEHN

AVERAGE VELOCITY = 1999 FPM

AVERAGE (WEIGHTED) % O2 = 3.33 *
AVERAGE (WEIGHTED) % CO2 = 15.76 *
AVERAGE (WEIGHTED) TEMPERATURE = 757

AVERAGE (ARITHMETIC) % O2 = 3.32 *
AVERAGE (ARITHMETIC) % CO2 = 15.75 *
AVERAGE (ARITHMETIC) TEMPERATURE = 753

AVERAGE STATIC PRESSURE (in. H2O) = -3.0
AVERAGE DENSITY (LBM/FT^3) = .02821

ACFM (ACTUAL FT^3/MIN) = 849555
LB/HR (WET) = 1437966

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED
NO. OF POINTS NOT USED = 1 OUT OF 49

IP12_004611

LOCATION = ECON EAST I_N
FILE IDENTITY = IP624_EEHN

AVERAGE VELOCITY = 1999 FPM

AVERAGE (WEIGHTED) % O2 = 3.33

AVERAGE (WEIGHTED) % CO2 = 15.76

AVERAGE (WEIGHTED) TEMPERATURE = 757

AVERAGE (ARITHMETIC) % O2 = 3.33

AVERAGE (ARITHMETIC) % CO2 = 15.76

AVERAGE (ARITHMETIC) TEMPERATURE = 753

AVERAGE STATIC PRESSURE (in. H2O) = -3.0

AVERAGE DENSITY (LBM/FT^3) = .02821

ACFM (ACTUAL FT^3/MIN) = 849555

LB/HR (WET) = 1437966

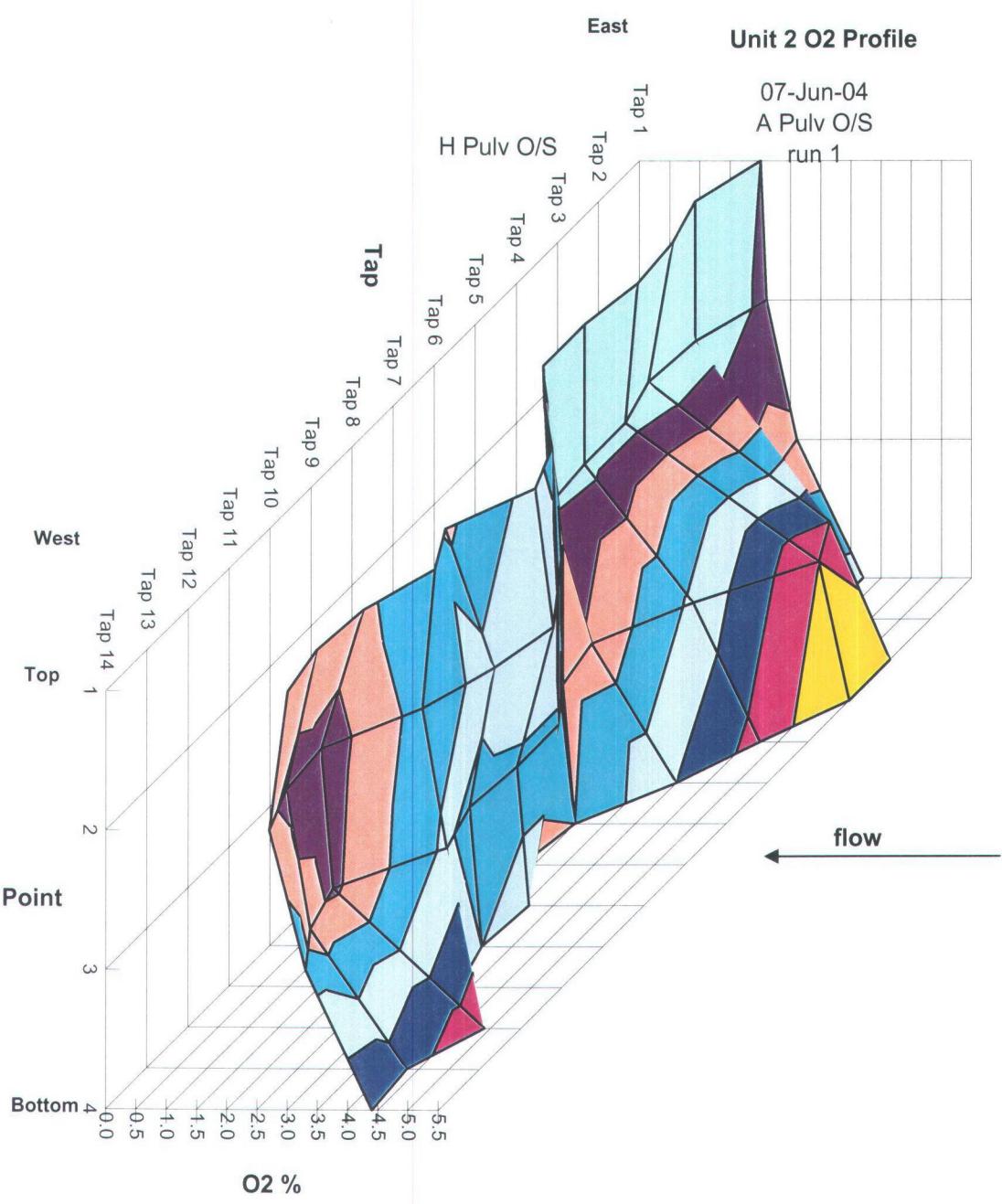
IP12_004612

DATE - 6/24/87
 LOCATION - WESTPRIGASIN
 FILE IDENTITY - IP6_24WPGI
 BAROMETRIC PRESSURE - 25.53
 PROBE IDENTITY - E-11
 DUCT HEIGHT - 9.0
 DUCT WIDTH - 18.0

TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
1	1	-4.0	740	.102	5	* 2.9	*15.6
1	2	-4.0	743	.107	0	3.2	15.8
1	3	-4.0	739	.107	5	2.9	15.9
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
2	1	-4.0	746	.104	20	2.9	16.0
2	2	-4.0	747	.122	15	2.9	16.1
2	3	-4.0	743	.097	5	3.0	15.9
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
3	1	-4.0	744	.070	22	3.1	15.8
3	2	-4.0	745	.112	5	3.1	15.9
3	3	-4.0	743	.107	18	3.2	15.8
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
4	1	-4.0	740	.075	7	3.1	15.9
4	2	-4.0	741	.029	21	3.1	16.0
4	3	-4.0	741	.061	10	3.1	16.0
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
5	1	-4.0	739	.004	0	3.3	15.8
5	2	-4.0	739	.004	0	2.8	16.2
5	3	-4.0	737	.004	0	3.3	15.8
TAP	POINT	STAT P	TEMP	DELTA P	YAW ANGL	%O2	% CO2
6	1	-4.0	740	.002	0	2.6	16.2
6	2	-4.0	741	.002	0	2.8	16.2
6	3	-4.0	739	.002	0	3.2	15.9

* - O2/CO2 DATA WITH ERROR GREATER THAN .35 NOT USED

IP12_004613



IP12_004614